RAILROAD GAZETTE

FRIDAY, MAY 16, 1902.

CONTENTS

The Standard Code on the Chicago & North Western.

The Standard Code of train rules has been adopted by the Chicago & North Western, and the new rules went into effect April 6. We note the principal features in which the code varies from the Standard, as issued by the American Railway Association.

The "General Rules" have four paragraphs not found in the standard; one of these refers to employment of minors, and one to assignment of wages. In the definitions that for a fixed signal is omitted. Watches are examined quarterly, and are also inspected weekly, the inspector making an entry on the back of the employee's card each week. A new card is issued each quarter.

Rule 3b reads "Conductors, enginemen, yardmasters and yard-foremen who have not access to a standard clock will obtain correct time from the train-despatcher daily, before commencing their work." Rule 5a reads "Full-faced type will be used at the ends of double-track, at junctions and at terminal stations, where the difference in time of trains is 30 minutes or less." Rule 6 has a number of signs, nearly all different from those of the standard. Rule 7 cautions trainmen to be careful to avoid taking a wrong signal when two or more trains are passing each other in a yard.

In rule 10 green means "proceed"; green and red, proceed with caution. A green and red flag is used to place at the side of the track where trains must run under control. Rule 11 provides for red fusees, but not for any other color. Rule 14d reads "West or north"; e, "east or south." The whistle signal for highways applies to overhead as well as grade crossings.

Rule 16a reads "One continuous whistle when brakes stick or wheels slide." Rule 16 does not provide any signal for starting a train, nor for backing. Rule 20 provides for green signals in the usual manner, although in Rules 8 and 10 green means proceed.

Rule 31b requires extra trains to sound the station-approach whistle when approaching curves. Watchmen at public crossings use green signals. Rule 81a reads: "At meeting points, extra trains, as regards each other, are superior in the direction in which regular trains are superior." Rule 83 has added this sentence: "This information will be furnished the engineman by the conductor upon a regular blank provided for that purpose." Rule 86 reads "An inferior train must clear the time of a superior train in the same direction at least ten minutes"; and this clause is omitted from rule 89. Rule 88 provides a clearance of five minutes. In this, and the other meeting rules, an inferior train is forbidden to run past the switch and back in except when authorized by train order to do so.

Rule 88a gives the yard-limit rule; the limit board does not protect against regular trains. Rule 90a reads "When trains meet by special order or time-table regulations, conductors and enginemen must inform each other what train they are. This must be done by word of mouth." In rule 91 the interval is ten minutes. Rule 95a forbids the running of freights or empty engines as a following section of a passenger train. Rule 97 has four supplementary paragraphs. Rule 98a limits the speed of passenger trains over interlocking switches to 25 miles an hour, and of freights to 15.

Rule 98b reads, in part, "No freight train must pass an open telegraph office not controlled by telegraph block system, except as provided by division time-tables, whether or not train order signal be displayed, until the conductor and engineman have received orders from the train despatcher or a release or clearance, as the case may require, from the operator. Conductors and enginemen of passenger trains will observe the same rule at such telegraph offices as are regular stops for their train. Extra trains will observe the same rule as freight trains, but extra passenger trains are not required to make stops solely for this purpose. They will be governed in this respect the same as regular passenger trains. This does not relieve operators from promptly displaying red signals whenever they have orders, or making other necessary efforts to stop trains."

All freight and extra trains must approach and pass all stations, side tracks and water tanks, under control; getting the speed under control must be begun one mile from such points.

Rule 99 and three supplementary rules fill nearly two pages. This rule requires the use of fusees at night in all cases. The first line of this rule begins "In case of stoppage between stations."

Rule 102a requires a flagman at all crossings when switching is being done; and 102b forbids the movement of cars in front of passenger stations or over highway crossings, detached from the engine. Cars containing passengers must not be moved unless coupled to an engine, and air-brakes in use.

Rule 104a reads "Where a distant signal is installed for the protection of a switch, and the signal cannot be seen from the switch, the signal must first be set at danger, and then sufficient time, not less than one minute, allowed for train to pass from the signal within sight of the switch before a train or engine shall leave the side track. Extra precautions must be taken in stormy or foggy weather.

Rule 104b requires an engineman, having backed into a siding, to see that the switch is set straight.

Rule 105 regulates the approach of trains to passenger stations where two trains approach at the same time; rule 106 regulates the carrying of passengers on freight trains. The final rule of this chapter, requiring that, in case of doubt, no risk shall be taken, is 114; and this rule (without the number) is printed at the head of each of the chapters for different classes of employees, in the back part of the book.

Rule 206 requires conductors' names to be written in orders, and train numbers of regular trains are written in words and figures. Time, in the body of the order, must be written in words and figures; the figures must not be surrounded by brackets, circles or other characters. There is no provision for the use of "19" orders.

Rule 208a requires meeting orders to be sent to the operator at the meeting point, if practicable. All train orders must have the suffix "12"; to be responded to by "13." If an operator is required to make additional copies of an order he must repeat those copies, the same as the original order.

Rule 210 provides that an operator must give the X response the first thing after receiving an order, and then repeat it. There is no provision for the use of the term "complete"; O. K. takes the place of this. The engineman must read his copy aloud to the conductor before proceeding. An operator at a meeting point, receiving an order, as required in rule 208a, must deliver two copies of it to the conductor first arriving, and the conductor must sign for them. Train order signals stand normally in the all-clear position, except when used to keep trains a required distance apart. A train must not leave a terminal without a clearance, release or train order.

In the blank for "31" orders, provision is made for inserting, as the first line in the order, the time when the last preceding train left.

Following the page on which form 31 is shown, are five other forms; a cross-over permit, a caution card, a clearance, a release from the train order signal, and a release from the train order and block signal. A note on the last mentioned says that when a block signal is in the diagonal position it only indicates that the block is clear to the first switch reached at the next block station.

The telegraph block signal rules begin with No. 300, as in the Standard Code, but the different subjects are not put in the order in which they appear in the standard, so that there is little or no correspondence in the numbers of the rules. The procedure for blocking trains is in principle about the same as in the Standard Code (rules 317 and 318), but the phraseology and the abbreviations are different. Among the definitions is one of the "positive block" and one of the "permissive block." The definition of the distant signal tells what the signal does. The rules for automatic block signals say that a train stopped by a block signal may proceed after waiting one minute, running cautiously to the next clear signal.

Under the head of interlocking there are definitions of the "high signal," meaning one 20 ft. or more above the track, and of a "mast." A dwarf signal is a low *home* signal. The indication for a diverging movement to a side track is given by a dwarf signal either at the foot of the high home signal or (if the high signal is at the left of the track) opposite to it. The light on the dwarf signal corresponding to the stop indication is covered with a shield.

Following the rules for interlocking signals are about 50 pages containing rules for the different classes of employees. The first chapter is for the telegraph department, the rules beginning with No. 700; then come those for agents, for the passenger service, for the freight service, for enginemen and firemen; miscellaneous; air-brakes; the track department and the bridge department. Among the rules for passenger trainmen is one requiring them, after departure from a station, to see whether or not there are any passengers clinging to the handrail of the vestibule. In the miscellaneous rules it is forbidden to allow outsiders to ride cars or assist in switching. No person, either in discharge of duty or otherwise, shall ride on the pilot of a locomotive. In the air-brake rules there is one requiring brakes to be tested ("the two-mile test") on approaching a terminal, a meeting point, a railroad crossing or a heavy descending grade. The conductor's valve may be used to apply the brakes on passenger trains, but it must not be used except in cases of emergency.

Automatic Block Signals on the Philadelphia and New York Divisions of the Pennsylvania Railroad.

WITH AN INSET.

The Pennsylvania Railroad Company now has its road equipped with automatic track-circuit block signals practically all the way from Jersey City, N. J., to Paoli, Pa., about 104 miles, and the line is four-track for substantially the whole of this distance, thus making what is probably the most elaborate railroad plant, for so long a distance, in the world; for the block sections are all less than one mile long, and, in addition to the block signaling, the stations and yards are nearly all equipped with complete interlocking. Switches which are not connected with a cabin, and interlocked, are equipped with electrical connections, so as to short-circuit the current of the track battery whenever the switch is not set straight for the main line, thus setting at "stop" the signals controlling the entrance to the block section in which the switch is located. The signals (semaphores) stand normally in the clear position, that being the standard practice of the Pennsylvania Railroad. Each signal goes to the horizontal position immediately after the locomotive passes it. All of the block signals are the Westinghouse electro-pneumatic.

Eighty-seven miles of the line here referred to consists of the main line of the New York Division, some of which has been automatically signaled for about ten years. It is now thus signaled throughout. The line has four tracks except at the Schuylkill River and a short distance west thereof; at New Brunswick, about one mile, and at Newark for a short distance. Through New Brunswick and through Newark the line will soon be rebuilt at higher levels and with four tracks.

Philadelphia Division.—The remainder of the 104 miles is from Philadelphia westward to Paoli, 17 miles, on the Philadelphia Division. The block signaling on this portion of the line is one of the most recent installations of electro-pneumatic signaling that has been made, and it is this that we shall here describe. This plant has a number of features which were introduced here for the first time.

The line is four-track throughout, and the signals are on steel bracket posts at the side of the road. The power is compressed air, as on the New York Division, but the electric current is supplied by a storage battery at each post, the batteries being charged from a dynamo situated at Radnor, 13 miles from Philadelphia. At this point there is a power house which contains the air-compressors and the dynamos. The storage batteries supply current for the track circuits as well as for the signal instruments.

The drawing on the inset, Fig. 1, shows the general arrangement of the tracks and signals. Beginning at the lower right hand corner of Fig. 1 (see letter P at right of sheet) the terminal station is Broad street, Philadelphia. From this point westward to Powelton avenue numerous changes in the line will soon be made, in connection with the new junction station which is to be built near 32nd and Market streets. The dotted lines, near mile-post 2, represent the New York Division tracks, which run beneath the westbound main track at this point. In stating the distance from Jersey City to Paoli we have omitted that portion of the line from Broad street to this point. At 52nd street (Schuylkill Division Junction, mile-post 4) extensive changes are also being made. The westbound main passenger track, beginning near the arrow shown in the drawing, is to be elevated above the freight tracks and run around the north side of the freight yard, rejoining the present line at O B tower. After the change is made, the eastbound Schuylkill Valley track, which runs into the eastbound main track, will be carried beneath all of the east-and-west tracks.

Bracket posts are adopted for this line, in place of bridges, because the stations are so near together, and for the purpose of locating the signals, in every case, so that they will be in the most suitable position for starting signals at the stations. It will be observed that, at any station, a train headed in either direction has a signal not far in front of it; and, of course, with this arrangement, a train standing at a station is always a considerable distance in advance of the home signal which protects it at the rear. In thus providing for station stops it was impossible, without making the block sections shorter than was required, to have eastbound and westbound signals always at the same point, so that if bridges were to be used each bridge would, as a rule, carry only two signals, a needlessly expensive arrangement.

The block sections are all very short. Those on the

westbound track, beginning at O B tower, are of the following length in feet (read down):

2,195	1,946	2,182
2,330	3,983	2,792
2,377	2,773	2,732
2,562	2,920	2,641
2,561	3,378	2,768
2,672	3,387	2,816
2,691	3,371	2,801
3,021	3,307	2,782
3,109	2,702	
2,106	2,376	

Those on the eastbound track, beginning at P A tower, Paoli, are as follows:

2,520	2,432	3,191
3,100	2,744	3,186
3,677	2,779	3,040
3,677	2,780	3,287
3,208	2,643	3,331
3,230	2,813	3,367
3,640	2,814	2,718
2,442	2,820	2,164
2,420	2,736	

The longest section is that on the westbound track near mile-post 10 (3,983 ft.) At this point the grade, westbound, is descending, whereas in general the westbound grade is ascending all the way from Powelton avenue to Paoli.

The bracket post with its foundation, and the iron box at the base, for the battery and relays, is shown in Fig. 2. The appearance of this post is shown in the photo-

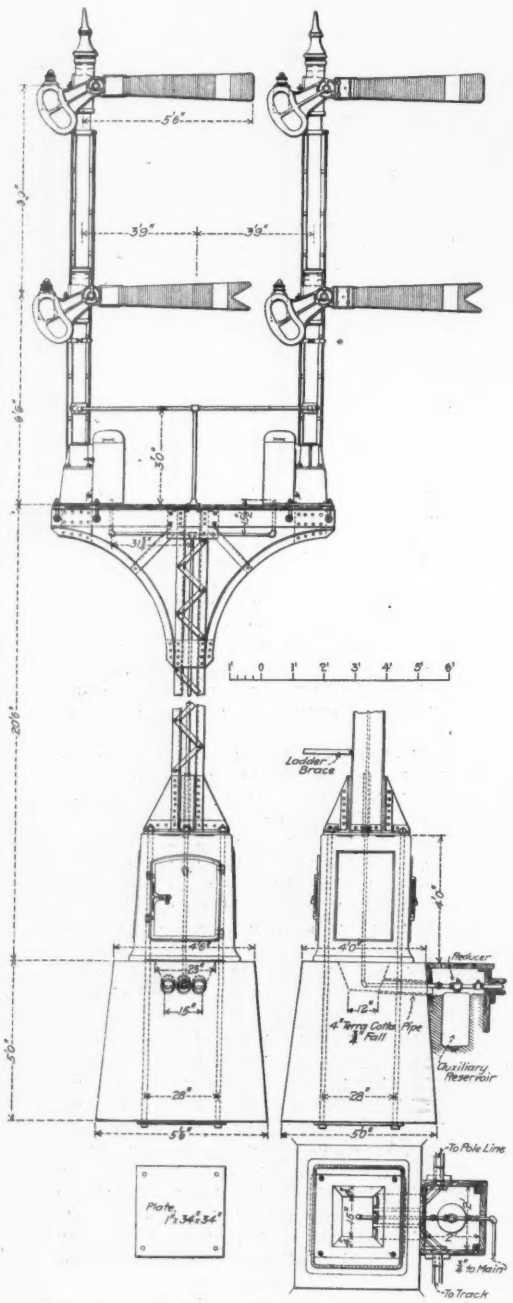


Fig. 2.—Bracket-Post Signal—Pennsylvania Railroad, Philadelphia Division.

graphs, Figs. 3 and 4. The foundation is concrete, iron bolts 1½ in. in diameter running down through from the foot of the post to the bottom of the foundation. A box, made of wood, is fixed at the side of each foundation, and there is imbedded in the concrete a suitable piece of wood, at each side, to which the box is fastened. The foundation is 4 ft. x 4 ft. 6 in. at the top, 5 ft. x 5 ft. 6 in. at the bottom, and 5 ft. deep. An iron plate, held by the four bolts, is fixed at the bottom. The air-pipe and the electric wires are carried to the signal instrument through terra cotta tubes, as shown.

The main air-pipe is laid in the ground between the two inner tracks. The feed wire for the batteries (copper, No. 6,) with weather-proof insulation, is carried on poles.

The power-house at Radnor is of brick, 25 ft. 6 in. x 73 ft. 10½ in., and the interior is lined with white enamelled brick to a height of about 12 ft. The power is furnished by two 125 h.p. boilers of the locomotive type. The two air compressors are Ingersoll-Sergeant Duplex steam driven, class H, with compound air cylinders and inter-cooler in base. The cylinder dimensions are, steam 12 in. diam., 12 in. stroke; low air pressure, 18 in. diam.; high air pressure, 12 in. diam.; both air cylinders have 12 in. stroke.

The electric current is supplied by two 500 volt Westinghouse shunt wound D. C. generators, 5¾ K.W. These are driven by 12½ h.p. Westinghouse "Junior" engines, directly connected.

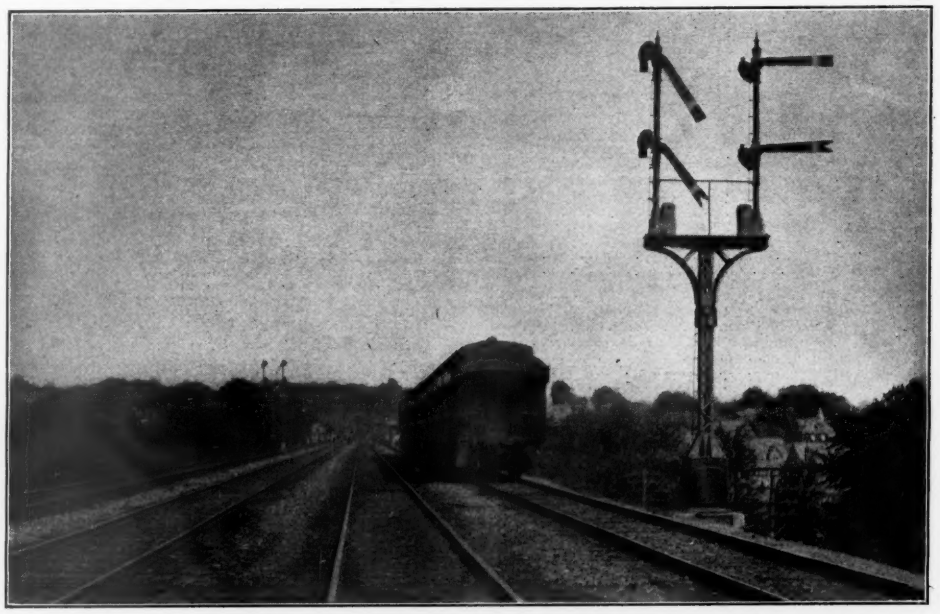


Fig. 3.—Signal Number Nineteen.

The chief duty of this power house is to pump water for the track tanks situated at this point; and the portion of the service required for supplying the signals with air and electric current is an almost inappreciable percentage of the total. The compressors run "turn about" as circumstances may require, and they are automatic, i.e., they vary the speed automatically as the demand for air increases or diminishes. The storage batteries can be charged in 10 hours, sufficiently to provide all needed current for 24 hours.

The storage battery at each post consists of two cells. One of these alone furnishes more than enough current for 24 hours.

Fig. 5 shows one side of the iron case at the base of the signal post, the half containing the relays, connections, and switches. The partition between this half and the other appears as the back of the enclosure shown in this figure. The other side, containing the battery, is shown in Fig. 6.

The interlocking (mechanical) for the switches and signals at the principal stations on this section of the road had been installed long before the automatic signals were put up. The signals at these interlockings are on bridges spanning the tracks, and each signal stands immediately over the track which it governs, as is indicated in the drawing. These signals have been made "semi-automatic" by attaching a pneumatic air cylinder to each main line high-speed semaphore and introducing a track circuit with the usual relay; the controlling wires run to circuit breakers on the different switch and signal levers in the cabin. The leverman is thus enabled to "clear" the signal, when the track is clear, and the train in passing puts it to "danger."

New York Division.—Fig. 7 shows two typical sections of the signaling on the New York Division. In general features the signaling of this and the Philadelphia Divisions is alike. Each block section is worked by a single track circuit, usually 3,000 ft. to 4,000 ft. long, with a home and a distant signal at the entrance of each section, the distant being for the section beyond.

As the drawing which shows the whole of the 90 miles of the New York Division is too large a sheet for reproduction here, even were the scale made very small, we have taken for illustration two typical sections; one of the oldest, from near Philadelphia to Holmesburg Junction, nine miles, and the newest section, from Monmouth Junction eastward to Stelton, 12 miles. Fig. 8 gives a typical view on the New York Division. The bridge shown is No. 436, east of Bristol, and the observer is looking east.

The New York Division, as before stated, is a four-track line, except at Newark, New Brunswick and the Schuylkill River. There are no grade crossings over other railroads, those formerly existing at Elizabeth and North Penn Junction having been changed to undergrade crossings. The principal terminal station is at Jersey City. The important junctions are at Meadows, Newark, Rahway, Monmouth Junction, Trenton, Morrisville, Frankford Junction and Germantown Junction. The junction at Morrisville is arranged to avoid crossing the passenger tracks at grade by bringing in the Trenton cut-off, across and above the passenger tracks and then down to a grade connection with the freight tracks.

Two of the four tracks are used for passenger traffic and two for freight. This rule is not an arbitrary one, and passenger trains are moved on freight tracks and vice versa whenever necessary to facilitate the traffic, based on the theory that the more elastic the method of operation, the better the results. The passenger tracks are shown in heavy lines on the diagram, and the freight tracks by light lines. By using the outside tracks for passenger traffic, with subways at all important stations, all necessity for crossing the tracks by passengers is avoided, making it possible for two or more trains to pass through a station without danger to the passengers of a train at the station unloading and loading. Between Newark and Jersey City the two south tracks are used for passenger service and the two north for freight, there being no stations between these two cities, and for the reason that the large freight yard at the Meadows is on the north side of the tracks. The passenger tracks are laid with 100 lb. rails and stone ballast; the freight tracks mostly with 85 lb. rails.

Forming as it does one of the two passenger lines between the cities of New York and Philadelphia, the traffic is very heavy, there being 81 through passenger trains, with a large suburban and freight movement. When the four tracks through Newark and New Brunswick are finished, with the elimination of the grade crossings in these cities, it will be no longer necessary to restrict the speed at any point. It will then be a matter of no great difficulty to run trains regularly from Philadelphia to Jersey City in 90 minutes; and with an all-rail connection to Manhattan, beneath the Hudson River, it will be possible to substitute "New York" for "Jersey City" in this statement.

The signaling of this line has been worked out very

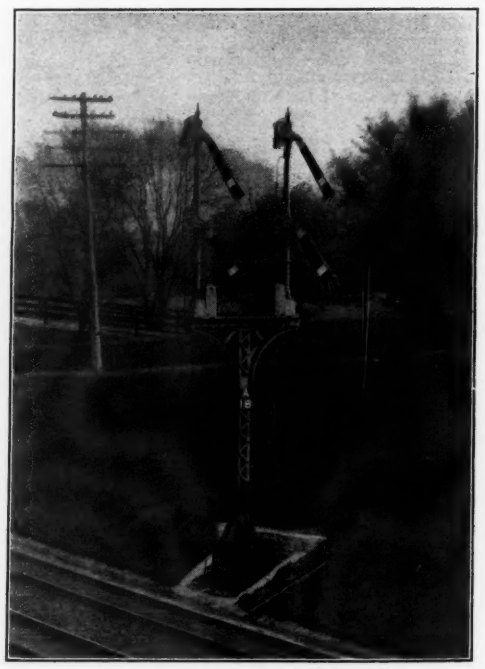


Fig. 4.—Signal Number Sixteen.

carefully. The interlocking system comprises 36 plants of the Saxby & Farmer improved mechanical or manual type and four Westinghouse electro-pneumatic power plants, with a number of other power plants under construction. In the 36 manual plants there are 803 levers; and in the four power plants there are 131; a total of 934. These levers operate 553 switches, 515 facing-point locks and 471 signals. Three of the power plants are at the Jersey City Terminal. This terminal is a model one. There are 12 station tracks covered by a single span train shed 250 ft. wide and 770 ft. long; separate platforms for baggage, with elevators dropping to the street level, convenient waiting rooms, a restaurant and a large office building. The signals are uniformly

located to the right of the current of traffic and either next to or exactly over the tracks they govern. Two hundred and fifty schedule trains a day are handled with great regularity.

As before stated the signals are operated on the normal safety method. The compressed air for moving the signals is supplied from a 2-in. main pipe extending the entire length of the line, a remarkable example of long-distance air transmission.

The air compressors are located at various water and coal stations as follows:

Location.	Miles from Jersey City.	Continuous Use.	Reserve.
J. C. Elec. Light'g Station	0	..	1
Waldo Ave. Roundhouse	1	2	..
Meadows Coal Station	4	1	..
Rahway Water Station	18	..	2
Millstone Junction Water Sta.	31	1	..
Monmouth Junction Water Sta.	40	..	1
Trenton Water Station	56	2	..
Bristol Water Station	66	..	1
Holmesburg Junction Water Sta.	76	2	..
Mantua Water Station	87	..	1
		8	6

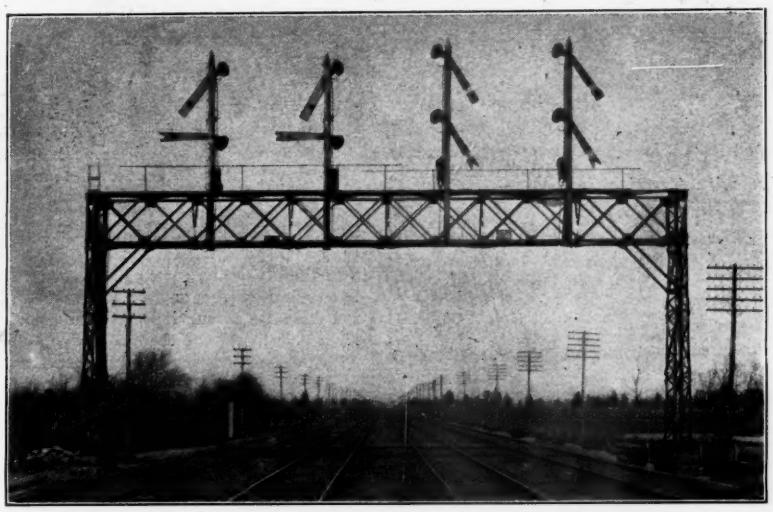


Fig. 8.—New York Division Pennsylvania Railroad, Near Bristol, Looking East; Signal Bridge No. 436.

The compressors in continuous service average about 11 miles apart. Half the compressors were furnished by the Ingersoll-Sergeant Company.

The polarized or wireless system of control, not requiring the use of line wires, is in use on about 20 miles. The balance is worked by the usual wires, all wires being run underground. The wisdom of this method of construction was strongly illustrated during one of the severe storms experienced this winter, which crippled the telephone and telegraph service throughout the East on account of the breakdown of the wires by sleet and high winds. The efficiency of the signal system was not impaired and it continued in regular operation during the entire period of the storm, something not possible if the usual overhead line wire construction had been employed.

The number of signals in use on the New York Division is 1,856, as follows:

Westinghouse automatic electro-pneumatic home and distant signals	1,229
Telegraph block signals (on branches)	76
Interlocking signals, manual and power	471
Distant switch signals	30
Drawbridge signals	20
Flag-station signals	30
Total	1,856

The force required to maintain these signals is as follows:

Repairmen, days, 24; nights, 8	32
Batterymen and helpers	29
Division foremen	4
Interlocking and block signal lampmen	62
	127

This does not include the office and store-house forces or the extra force for construction work. The Division is divided into four sections, each in charge of a foreman, who is responsible for all signals on his section. The foremen report to a Supervisor of Signals located at Jersey City. The first Supervisor of Signals on the New York Division was H. M. Sperry, who resigned in 1891 to enter the signal business. He was followed by Messrs. G. H. Holsman and Geo. W. Miller; and the present Supervisor is Mr. J. E. Gillmor. All material used by the Signal Department is received at the store-house at Trenton, where it is carefully inspected before being issued for use. The Amboy and Belvidere Divisions also receive their supplies through this store-house. An incidental bit of evidence showing the care exercised in the maintenance of the system, is to be found in the pressure recording gages which are located at convenient points for recording the pressure maintained in the main air-pipe. The signal blades are painted and varnished at the store-house at Trenton, a duplicate set being furnished for this purpose and distributed twice a year. They are kept bright during the six months by simply washing them off.

At the three power plants at Jersey City electric lights are used in the lamps. At other places the lamps burn oil, the oil being stored along the line in cast-iron tanks, thus avoiding small oil-houses which are not only unsightly, but dangerous.

Train Movement.—With this complete system of block signaling and interlocking, it is possible to handle trains by signals and almost wholly eliminate the use of train orders. The rule on this point reads as follows: "The movement of all trains will be governed by the signals at the following interlocking stations without train orders, except when running opposite tracks, when they must obtain train orders in every case." Here follows a list of 23 interlocking points, covering all the principal junctions and switches on the New York Division. "Trains on freight tracks receiving signals to enter passenger tracks, except opposite tracks, will proceed as schedule trains. Trains on passenger tracks receiving signals to enter freight tracks, except opposite tracks, will proceed on freight tracks until signal is given to return to passenger tracks." This method of operating greatly facilitates the movement of trains. For example, should a through eastbound passenger train overtake a local passenger train at H U Tower, 26 miles from Jersey City, the despatcher would simply direct the operator at H U to move the passenger train from track No. 1 (passenger track) to track No. 2 (freight track) which he would do by setting the proper cross-over and signals: the through train, without stopping, would then run from No. 1 to No. 2, the local continuing, in the meantime, on No. 1 and stopping at the various stations; the through train on passing the local train would then be brought out again on track No. 1 at D X Tower, Milepost 20, thus having overtaken and passed the local train without stopping and without the issue of any orders whatever, the signals directing the movements and the interlocking and block system providing full protection for both trains at every step of the journey. This method of handling the trains reduces the work of the despatcher to a minimum, enabling him to make movements of one train past the other with little or no delay and by means of the block system and interlocking with full protection for each movement. This feature also was fully tested during the storm of last winter. For a period of 30 hours trains ran absolutely under the direction of the signal system, as there was not a telegraph line in commission during that time between Jersey City and Philadelphia. In fact, the entire operation of trains had to be left to the automatic block signals and to the operators at the interlocking towers.

As a matter of convenience, at points where telegraph stations are some distance apart, telephones have been established at the signal bridges, there being 100 in use between Newark and Philadelphia. These telephones connect with the nearest interlocking towers, and they are indicated on the diagrams by the letter "T." Conductors, enginemen, signal and patrolmen are provided with keys to the telephone boxes, thus making it possible to send prompt reports of any unusual occurrences. They are found to be a great convenience.

A bit of evidence as to what can be accomplished on this line, is shown in a record made on Monday, March 24th, 1902. On that day, at short notice, a special train, engine and two cars, carrying the president of the road, was run from Broad street, Philadelphia, to Jersey City, 89.76 miles, in 1 hour 19 minutes (12:19 p.m. to 1:38), at the rate of 68.17 miles an hour. This is one of the fastest long distance runs on record. The regular traffic, which, as previously stated, is very heavy, is handled with a marked degree of safety and regularity.

A six-track railroad.—The line from Philadelphia to Holmesburg is of special interest because, for nearly all of the way, this section is a five-track or a six-track railroad. These outside tracks have been built from time to time to accommodate the very numerous factories of various kinds which line the railroad in this region. These outside tracks, being used entirely by slow-moving local freight trains, running on rather irregular schedules, are not signaled.

This method of protecting from delays the fast trains on the high-speed tracks is, of course, a costly one; but it has been found necessary. Indeed, it is the only way to insure speed and regularity where the number of passenger trains is so great as on this road; and, with the increase of both the fast passenger traffic, and the local freight traffic to and from the factories, the need of keeping switching movements entirely clear of the high-speed tracks becomes an important factor in safety as well as in convenience.

The principal difficulty in providing, in this way, for local freight traffic is in getting the switching freights past the passenger stations. The only perfectly satisfactory method of dealing with this question is to put the passenger station above or below the level of the tracks; but in many cases this is, of course, impracticable, except at very great cost. And where the natural surface of the ground is at the track level, and the local passenger traffic can be confined to the outside tracks, a station which is above or below the track level has the further disadvantage of necessitating much additional climbing for the passengers.

With stations at the track level the only thing to do with an outside freight track is to break it off before reaching the station, or to run it between the station and the passenger tracks, the platform being laid even with the tops of the rails. Which of these solutions shall prove most feasible in any particular case depends, of course, largely on the nearness of the factory or switching point, and the number of freight movements to be made daily.

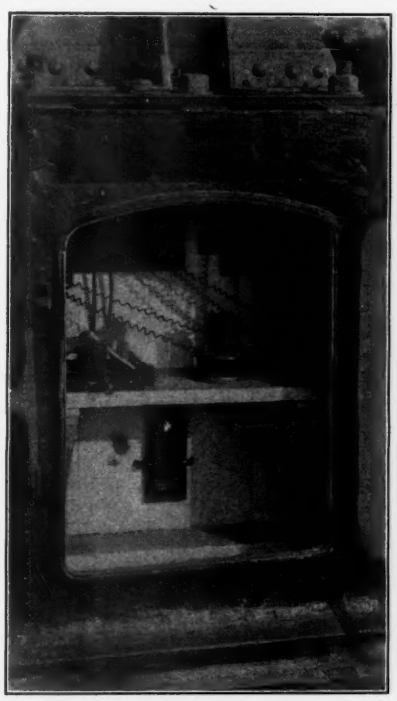


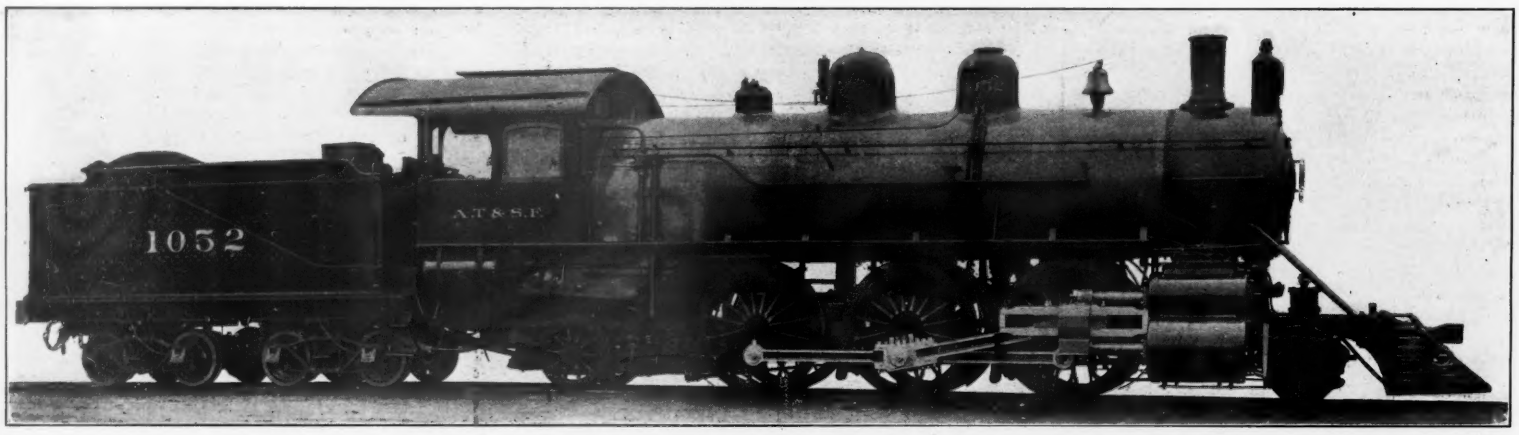
Fig. 5.—Relays and Switches.

Fig. 6.—Storage Battery.

Standard Train Order Form E.

A paper on form E Time Orders, which was read before the Richmond Railroad Club, at the April meeting, by Mr. E. P. Goodwin, was published in the *Railroad Gazette* April 18, page 283. From the report of the discussion, which appears in the Proceedings, now at hand, it seems that the question concerning the merits of this form was brought up by reason of the fact that some of the railroads in Virginia forbid the use of the Time Order (Example 2), directing a train to wait at a certain point until a certain time, for a specified opposing train. It is said that if such an order requires a train to wait at one or two stations for two trains, and at a third station for

another train, the men who are required to act on it have, in a number of cases, become confused. It will be remembered that Mr. Goodwin, in his paper, recommended in place of form E, the use, in every case, of a schedule naming the time at which the delayed train would leave each station; a schedule substantially the same as is issued for an extra train under form G-3. The question was asked whether this style could be used without naming all of the stations, and Mr. Goodwin replied that it could; that such practice was common. Many roads use, for form G, a blank on which the stations are printed; this blank could be used for form E orders. Incidentally, Mr. Goodwin condemned the practice of notifying sectionmen when a special train is to be run; it impairs your confidence when you want to run a special without notice.



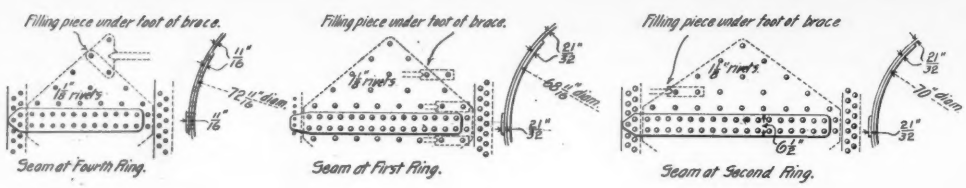
Prairie Type Freight Locomotive with Traction Increaser—Atchison, Topeka & Santa Fe.

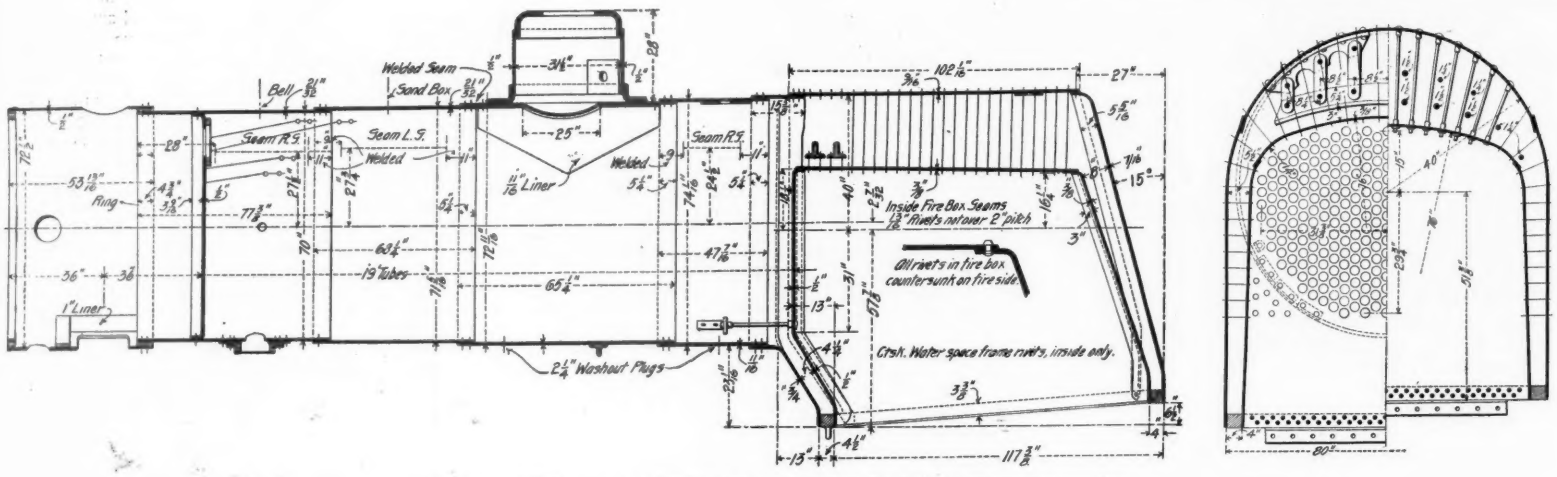
Prairie Type Freight Locomotives with Traction Increasers—Atchison, Topeka & Santa Fe.

In the *Railroad Gazette* of Nov. 22, 1901, and Jan. 17, 1902, we illustrated and described the Prairie type passenger locomotives of the Atchison, Topeka & Santa Fe, No. 1000 and No. 1017, without and with traction increasers, in the order named. A profile of the division on which the heaviest work of the system is done was shown in the issue of Nov. 22, and a summary of requirements and performance of the most powerful passenger locomotives on the road was given editorially. In the issue of Jan. 17 we mentioned 45 locomotives that were being built at Baldwin's, all of which were to have traction increasers. These locomotives are now being delivered and the accompanying drawings show some features that we have not previously illustrated and also some slight differences between these 45 locomotives, which are for freight, and the passenger locomotives, earlier described.

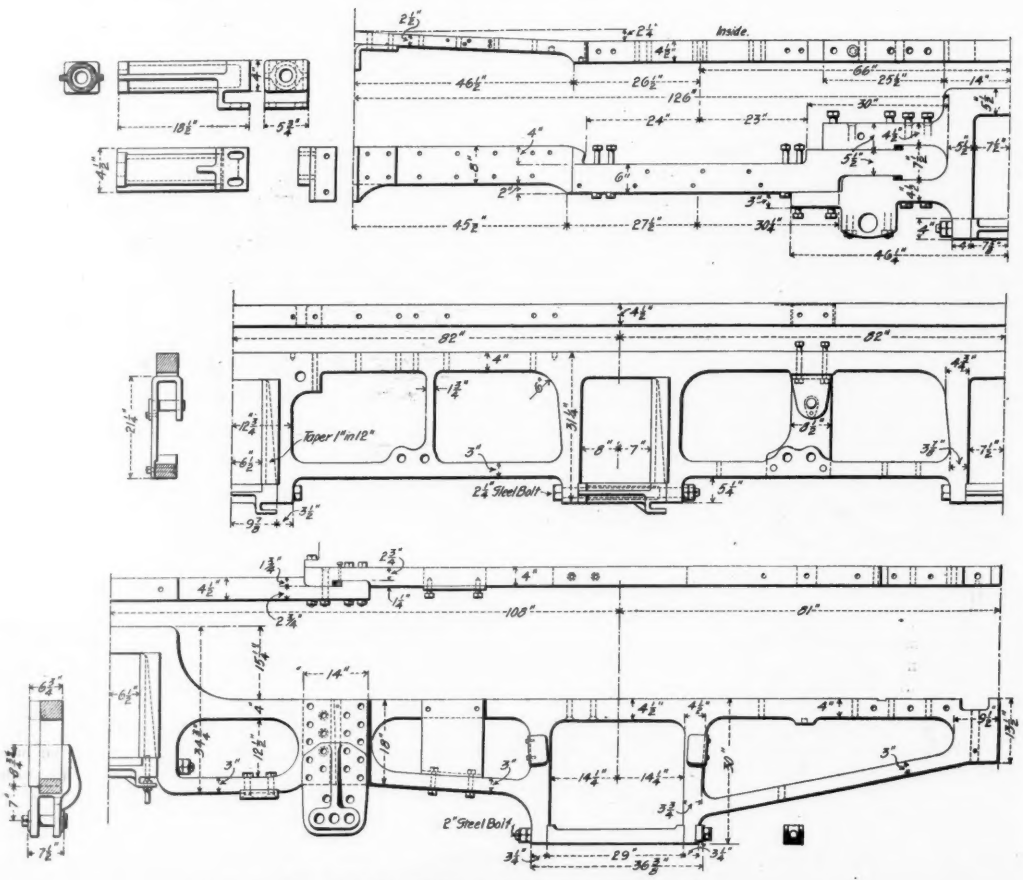
The cylinders, wheel base, total heating surface and grate area of the freight locomotives are the same as for the passenger locomotives. The driving wheels of the freight locomotives are 69 in. in diameter; the front engine truck wheels are 31¼ in. and the back engine truck wheels are 40 in. in diameter, as against 79 in., 42½ in. and 49 in. for the passenger engines. The boiler is here illustrated in such a way as to make the work entirely clear and some interesting features will be found in the way the several courses are joined and also in the staying. The leading truck, which shows an adaptation of the three-point suspension, is also fully illustrated. The Rushton trailing truck, as used, is shown in part plan, elevation and sections, and is so well known to our readers that it requires no description in detail in addition to a view of the drawings. The frames show some interesting work and of the journals and weight distribution, with and without the traction increaser, it may here be said that the figures given in the issue of Jan. 17 for the passenger locomotives, give the correct relations for the freight locomotives also.

These freight locomotives have traction increasing cylinders at back and front, practically the same arrangement as that shown on page 41 of the issue of Jan. 17, except that the traction increaser at the rear of the locomotive is fitted up to conform to what is known at the Baldwin works as Style No. 2. Drawings of this arrangement are shown herewith, and it may be noted that the difference consists in curving the back equalizer bars, slotting the end of the traction increaser piston rod and also in curving the lifting up bar which crosses from side to side of the locomotive and comes in contact with the back equalizer bars when the traction increaser is applied. There is also shown a set of hangers from the back equalizer bar, to the uplifting bar, made with





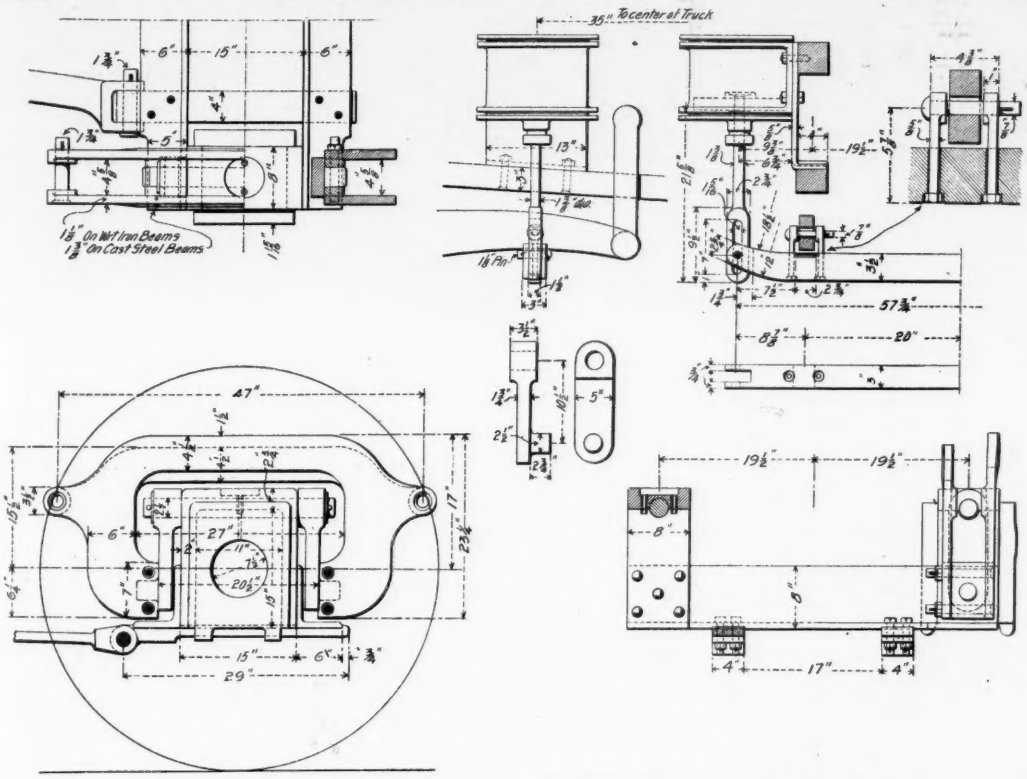
Boiler and Details—Atchison, Topeka & Santa Fe Prairie Type Locomotive.



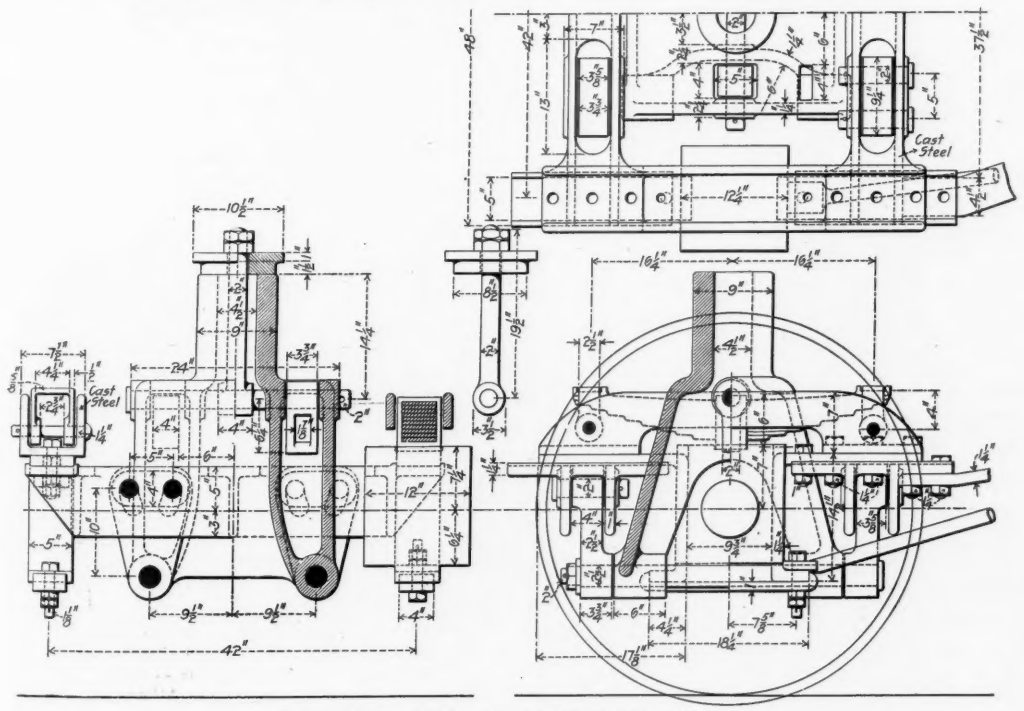
Frame of the Atchison Prairie Type Locomotive.

eyebolts and a pin and cotter, which were not used in Style No. 1.

With these differences noted, and the illustrations which are now given before the reader, the record of construction of these Prairie type locomotives for passenger and freight work will be found to be quite complete.



Details of Rushton Trailing Truck and Traction Increaser, Atchison Prairie Type.



Front Truck—Atchison Prairie Type Locomotive.

The Union Pacific and Southern Pacific.*

About four years ago when the Union Pacific emerged from bankruptcy, and the present management took possession, we found a railroad incapable of doing business which was tributary to it. We went to work and in the first year we increased the capacity of the equipment. We added, in the first year, about 84 per cent. to the total capacity of the freight equipment alone, and incidentally, of course, we had to add motive power to carry that increased capacity.

Perhaps some of you who have ridden over the Union Pacific within the last six months have noticed the work that has been done on what we call our "Rocky Mountain Division." The problem was how to improve that line so as to serve the territory tributary to it in the best manner and in the most economical way. We commenced our surveys, and from one step to another in about two years and a half from the time we began we reduced the grades of the Union Pacific from a maximum of about 90 ft. to a maximum of 43 3/10 ft. We also eliminated curvature and reduced it from a maximum of 10 per cent. to 4 per cent., having only in one instance a curvature of 6 per cent. for a short curve. [Probably Mr. Harriman said "degrees," not "per cent."; but the reader will know what he meant to say.—Editor.] We built 158 miles of railroad and threw away 188 miles; we abandoned 188 miles of road that was already in existence.

It took some nerve to throw away $5,000,000 or $6,000,000 worth of railroads and to put $6,000,000 or $7,000,000 more new ones in to do the same business. I only use that as an illustration of what was done on the Union Pacific.

Since I have been charged with the management of the Southern Pacific and all the lines included in that system, by the perseverance of the officers of the Southern Pacific, we have placed the improvements before the committee and have succeeded in getting authority to expend this year, or to begin improvements this year, which will amount to about $20,000,000, most of which will go into effect this year, or the results of it. That means the improvement of the coast lines southerly from here to Los Angeles, the finishing of the tunnel through Simi Pass, the improvement of the lines from Los Angeles east to El Paso; the elimination of curvature, the improvement of bridges, the laying of new rails.

But the most striking improvements will be, and the one which I think more interesting to you than another, the improvement which we are now carrying on on the eastern end of the Central Pacific. It is practically carrying out the policy which I have just explained to you we adopted on the Union Pacific.

We have on the division from Ogden to Reno, a distance of about 580 miles, the same conditions which existed on the Union Pacific, only exaggerated. We have grades on that line amounting to about 97 ft. to the mile. We have many curvatures amounting to 10 deg., but we have adopted a line which will reduce those grades from 97 to 21 ft. We reduce the curvature the same. From 10 deg. to a maximum of 4 deg., and not very much of that. The elimination of curvature on that line will amount to something like 40 complete circles. That is, the train that formerly went round 60 times in making that 580 miles will now go scarcely 20.

Between November last and next July we will have delivered to us, and are now having delivered to us, additions to the freight equipments amounting to some 8,000 cars, adding to the tonnage capacity in this six or eight months about 20 to 22 per cent. of the tonnage capacity existing over the whole line. Of course, being properly proportioned to the whole line, and the whole equipment, as my recollection is, an addition of something like 400 per cent. in that time.

I have heard that a great many complaints have been made because there has not been enough oil freight capacity. But the additional equipment ordered for the Southern Pacific without much being said about it will give us an additional capacity of 12,000,000 gallons. In addition to that we have commenced a system for storing oil at convenient points on the line—of course for our own use; we are not going to compete with the merchants or manufacturers or any one else, but when we improved by the adoption of oil as a fuel we thought that to be safe we should have at least six months' consumption on hand. That means that we are putting up and hope to finish before July a capacity for storing about 4,250,000 bbls. of oil. That makes us safe.

*Mr. Harriman's speech at a banquet in San Francisco.

Iowa Railway Club.

The proceedings of this club for February and March have just been issued in a single pamphlet. From the papers printed we extract the following paragraphs:

By *Geo. W. Dailey*, Trainmaster C. & N. W. Ry., Eagle Grove, Iowa.

"The Trainmaster, Assistant Superintendent, or whoever has direct charge of the men, should spend as much time as he possibly can out with his men when they are at work, showing them as opportunity presents, the best methods to be followed in different cases, and imparting to them the latest and best ideas and practice. Get them to thinking that it will pay them to gain all the knowledge they can. Get them to realize the benefits of knowledge, and get them to understand that in order to obtain promotion they must show capacity for increased responsibility. An officer should set them a good example, which they will in time unconsciously imitate. If he is fair, square and honest with them, they will as a rule be the same with him, and he can eventually influence them to his own way of thinking. In many cases they will pattern after him. Officers directly in charge of men can do more to educate than we are aware of. It is through these subordinate officers that the most lasting results can be accomplished. They know each man individually and know just how to deal with each to get the desired result.

"To get good men when new ones are wanted, we should not wait until a heavy rush of business strikes us, then catch anything that comes along. When passing back and forth over the division, always keep your eye open for the best young material you can find. You will always find plenty of bright young men. Do this when you are not pressed for men. Keep it up all the time. Have them fill out preliminary application blanks, with the understanding that if you want them later they will be sent for."

By *T. H. Beacom*, General Yardmaster C. M. & St. Paul Ry., Savanna, Ill.

"There are two classes of railroad employees. One considers its own personal convenience first. It cares nothing for the destruction of company property except where the act would cause dismissal. This element can be charged with the increased cost of repairs due to the automatic coupler. The old style link and pin coupler was a guarantee of protection to cars and contents as the danger to themselves was their consideration. . . . Many conductors are made of men who are not even competent brakemen and should never have been promoted. The service is weakened in admitting to the ranks in any capacity the mental or moral degenerate who later on may be protected by some labor organization and who may receive promotion under the seniority clause. Seniority places the capable and incapable men on the same basis, thereby extinguishing the light of ambition in the intellectual employee.

"Organizations [labor] are neglecting a good work by not making it obligatory on their members to render the best possible service to employers. A membership in the different organizations should be a guarantee to railroad companies that from such members they would be sure of the highest standard of service. In justice to the capable employees the Brown System should be dispensed with for a time, and inefficient men should be picked out and re-educated or dropped from the service, for by retaining them the principle of equal compensation is abused. It is useless to expect employees to put forth their best efforts when they know that the companies seldom go outside of certain channels to select official timber. It is a mistake to presume that the negligent employee can be raised to the standard of the careful and painstaking by disciplining the latter equally with the former in identical cases. On the contrary, you are more likely to lower the standard of the good man to that of the other.

"Heads of departments should personally know the worth of each individual and show them that good service is appreciated as much as poor service is depreciated. Make the best service the standard, and those who cannot appreciate good treatment by rendering good service should be made to step down and out. Mild discipline to this class is a detriment to the service."

High Speed Brakes.

At the April meeting of the Central Railway Club, the committee composed of Messrs. O. M. Foster, E. A. Miller, Wm. Owens, F. M. Nellis, S. D. Hutchins, presented a very interesting report on high speed brakes, substantially as follows:

There is undoubtedly a very general and well founded conviction among those closely in touch with the actual operating conditions of passenger train service, that the quick-action brake is unequal to the demands of the present service, and that something more efficient in emergency, and affording a greater reserve braking power after more or less heavy service applications, is demanded, both as a matter of safety in being able to stop in the shortest possible distance in case of danger or accident, and as furnishing a means for safely handling trains with the greatest celerity at slowing down and stopping places. Probably the necessity for such a brake on trains which are scheduled to run continuously at a high rate of speed is generally apparent.

There is also a need for the most efficient brakes upon passenger trains which, while their schedule may be slower, yet, as a matter of fact, frequently run at as high a rate of speed as trains of faster schedule.

Emergencies know no law of time, place or train, and some of them may occur while a train considered slow, is running at a high rate of speed, or to a train which ordinarily runs fast; and in such a case the consequences of disaster may be fully as serious. The necessity for stopping in the shortest possible distance, and the consequent need for the high-speed brake is equally as imperative as though the train were a faster one. In passenger train wrecks it is the "last 20 ft. that kills," and how many accidents can railroad men recall wherein loss of life would have been saved by a brake which would have stopped the train a few feet sooner.

Looking at the matter in this light it is not difficult to say that unless there is some very sufficient obstacle in the way, every passenger train should be equipped with the high-speed brake. Emergencies constantly arise from accidents to parts of the locomotive or cars, defects in tracks or misplaced switches, failure to properly flag and the danger consequent on running at fast speed through dense fog or blinding storm which make it imperative that every engineer to whose care is intrusted the safety of human lives should have at his hand the very best means for stopping, that human ingenuity has devised. It should also be borne in mind the average speed of passenger trains is being accelerated and that many which may appear slow on account of making numerous stops are in reality far from slow when in motion.

The influence of competition is always in the direction of quicker service, and a consideration which will no doubt appeal strongly to hustling railroad officials is the fact that this device properly used shortens the time used in stopping and approaching targets and in slow downs, and this materially shortens the time on the road without increasing the present average rate of speed.

When the quick-action brake superseded the old automatic brake in passenger service, and when the air-brakes supplanted the hand-brakes on freight trains, engineers quickly learned the reduced distance in which stops could be made and the greater speed at which trains were under safer control, and there was a consequent increase in the safety and despatch with which traffic was handled. We are now offered another device whereby an equally satisfactory advance may be made.

Probably in the absence of any really serious obstacles the reasons here mentioned would be regarded as sufficient for resorting to the general use of the high-speed brake in passenger service. The first objection which suggests itself in connection with braking with 110 lbs., train line pressure is the probability of sliding wheels. This may be answered by the fact that though the brake has now been in service for several years it has not resulted in sliding wheels. It is known that at high speed the brake-shoe friction on the wheel is much less than at slower speeds, and that the adhesion between the wheel and rail is about the same. It thus follows that at fast speed, greater braking pressure may safely be used, and in fact must be used, in order to retard the motion of the train as effectively as is done by less pressure at slower speed. Advantage has been taken of these facts to increase the pressure in emergency applications from 60 to 85 lbs., providing, however, a reducing valve attachment is applied to each brake-cylinder, whereby this pressure is gradually reduced, as the speed decreases to 60 lbs., where it remains until released. There should thus be no danger of wheel sliding unless the brakes were applied in emergency at slow speed, which would be improbable, inasmuch as this brake offers a service application brake cylinder pressure of 60 lbs.

This brake is handled in the same manner as the quick action, and since such high pressure is carried in the auxiliaries, three full service applications may be made and still have pressure sufficient for an emergency application equal to that of the present brakes.

The advantages of this feature in the handling of trains cannot be overestimated. Many an accident has occurred, because after applying and releasing a couple of times an emergency arose and the engineer had no air with which to meet it. So far as sliding wheels in service application is concerned there should not be particularly greater risk on slow than on fast trains, and engineers can be depended upon to come forward with the necessary skill and care in manipulation.

The next objection suggested is that the employment of such high power must result in tearing down brake rigging. It may be noted on this point that the improved M. C. B. standard brake-gear has been found adequate for the purpose.

As to the efficiency of this brake in emergency, it has been demonstrated that a train moving at 60 miles an hour can be stopped in about 30 per cent. less distance than with the quick-action brake. No information is at hand as to what results would be obtained with speeds of 75 or 80 miles per hour. These speeds are not now unusual.

The apparatus and changes necessary for converting the quick-action to the high-speed brake are few and simple and not very expensive. They consist of a special driver and engine truck triple with reducing valve. A duplex governor, which may regulate the pump to stop at either high or ordinary pressure. Double feed valves which may be used for either pressure. A quick-action triple and reducing valve with cut-out cock for the tender and automatic reducing valve for each brake cylinder under the cars. A safety valve has been made which may be screwed into the brake cylinder oil hole of any ordinary braked car, being temporarily operated in a high-speed braked train.

The necessity for stronger hose and better pipe work with high-speed brakes will be discussed by the committee at the next meeting.

Freights and British Shipping.

The condition of the freight markets is such as to arouse serious anxiety with regard to the immediate future of our shipping industry. Fortunately the shipowners have had two or three years of great prosperity from which they ought to have emerged fairly well prepared to meet a period of severe trial.

Two things are certain; first, there is at present an over-supply of tonnage in the world; and second, the volume of merchandise requiring sea transport will be less in the near future than it has been in the recent past. With regard to the first, there is no remedy in sight, while almost every shipyard in the country is booked full of work for several months to come, and American, German, and even Japanese shipbuilders are steadily increasing their output. With regard to the second, one or two significant facts may be mentioned.

The enormous falling off in the maize crop of America will result in the reduction of the exports of that cereal to about one-fourth of those of last season. The short crop of maize has caused such a demand for oilcake in the States for cattle feeding that the exports of this item also will be reduced to a minimum; indeed, we hear of exporters paying cash indemnities to cancel contracts, because they can do so much better with their goods at home. The scarcity and dearness of maize will curtail the shipments of pork, ham, and lard (because fewer hogs will be raised), and of everything produced from or by the aid of maize. The cotton crop also is short, and, although the wheat crop is not, the shipments of wheat are already far ahead of the season, because exporters have had to fill up chartered tonnage with this grain in the absence of maize. Therefore there will be so much less wheat to come across during the remainder of the season. The shortage of eastward-bound cargo may, to some extent, be set off by a great development in the exports of American coal, but many circumstances will combine to limit such development. And the volume of ocean carriage is further reduced by the shrinkage in the foreign demand for British coal.

Nothing so low as some of the freights now current has been seen since 1894, when, however, bunker coal was barely more than half the price the shipowner has to pay to-day. It will be readily understood that the position of shipping now is even worse than that experienced during the depression of six or seven years ago. In fact, so acute has it become, that in scarcely a single trade, even with the most economical vessel, is it possible to make profit, whilst in some cases (America, for instance) the loss on a single voyage may closely approach four figures. If that is the case now, what will it be in the dead season when the Baltic, Black Sea, and St. Lawrence are closed?

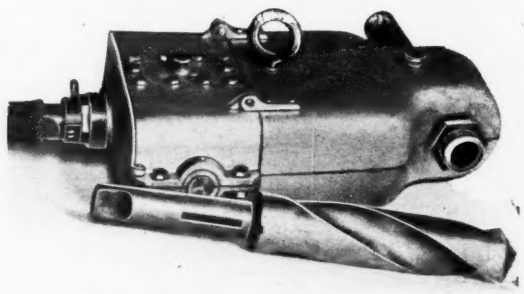
British shipowners appear to have made two great mistakes—the first, in selling too freely their second-hand ships to foreigners to compete with them on uneven terms; and second, in investing the proceeds too soon in new ships.

It is the cargo tramp which is, and will be, the chief sufferer. The tramp owner is not only caught by the depression in freights and the elevation in working expenses, but he is being driven out of best routes by the big cargo "liner." Between the Northern States of America and the chief ports of North Europe all the carrying trade is, or can be, done by the mammoth cargo boats of the great lines, carrying as much on one voyage as an ordinary "tramp" can carry in four or five voyages. The tramps displaced from the North Atlantic have to seek employment elsewhere, and in the African, Eastern and Colonial trades they are finding the same sort of thing developing. The tramps still have the trade of the Southern States and of South America, but it is not enough, and who can say how long they may retain it? No doubt the tramp driven out of one trade route seeks, and may in time develop both new trades and new routes. But this takes time, and while the grass is growing the steed is starving.

What makes the gloom of the present outlook so heavy is the large amount of new tonnage recently launched and under contract to be built, and the fact that a very large portion of this new tonnage is in the form of cargo-liners and of leviathan tramps. The misfortune of the big type of tramp is that while it is run out of the chief deep-water ports by the "liner," it cannot enter the shallow-water ports to compete with the handy type of cargo-boats that can go anywhere and carry anything. Without dwelling on this, or attempting just now to forecast the possible effects of American, French, and other subsidies, the bald statement of the situation is disquieting enough. Seldom, if ever, was British shipping in a more depressed and unremunerative condition, and never was there more new tonnage being constructed in all the ship-building countries of the world.—*The Economist.*

Helwig Reversible Pneumatic Motor.

A pneumatic motor which is claimed by the maker to be very economical of air and which can be used in confined places where a ratchet is ordinarily used, is sold by the Helwig Manufacturing Company, of St. Paul. There are two general styles of these motors, the end-spindle and central-spindle. The illustration shows the end-spindle drill. These motors range in weight from 20 to 35 lbs., the first being for wood boring and the latter the heaviest style of end drill. The speeds range from 1,000 r.p.m. for the wood drill to 140 r.p.m. for the end



The Helwig Reversible Pneumatic Motor.

drill, with a free air consumption of 12 cu. ft. per minute at 80 lbs. pressure for the former, and 18 for the latter. The motors are of the piston type, are valveless, have double-acting cylinders and are reversible. They are made of bronze brass and steel; they have a brass frame and an aluminum casing, and have shown excellent durability in service. Simplicity of construction, accessibility of parts and ease of repair are additional features of merit.

Experimental Locomotives in Egypt.

The *Engineer* (London) of Feb. 7, describes six locomotives which were built in the last year for the Egyptian State Railways. Two of these engines were built by Dübs & Co., Glasgow, to the designs of Mr. F. H. Trevithick, Locomotive Superintendent of the Railways, and the other four engines were built by the Brooks Works of the American Locomotive Company. One of the Dübs' engines is Atlantic-type passenger and one is consolidation freight. There are also a Brooks, Atlantic-type passenger engine and a consolidation freight, and the other two locomotives are 10-wheel Brooks passenger engines. The building of these engines was thus apportioned to give opportunity for careful experiment to determine the relative merits of the several types and designs.

The Dübs Atlantic-type engine has cylinders 20 x 26 in., balanced valves and Stephenson link motion. The boiler is Belpaire, the center line is 8 ft. 6 in. above the rails, the diameter of the barrel is 64⅛ in., and the fire-box is copper, 89 15-16 x 41½ in. The grate area is 26 sq. ft., and there are 242 brass tubes, 2 in. in diameter. The total heating surface is 1,996 sq. ft., and the working steam pressure, 180 lbs. per sq. in. The driving wheels are 78 in. diameter, the truck wheels 36 in. diameter, and the trailing wheels 51 in. diameter. The wheel-base of engine is 26 ft. 10 in.

The Dübs consolidation engine has 21 x 26 in. cylinders and balanced valves with Allen straight-link motion. The barrel and tubes of this boiler are the same as those of the passenger engine, and the fire-box is also of copper, 103 15-16 in. long x 41½ in. wide. The grate area is 30 sq. ft., with a total heating surface of 2,200 sq. ft. and a working steam pressure of 180 lbs. per sq. in. The total wheel-base of this engine is 24 ft. 11 in.

The cylinders of the Brooks Atlantic-type engine are 20 x 26 in. with direct-driven piston valves. The barrel of the boiler is 60 in. diameter and has 260 brass tubes, 2 in. diameter and 15 ft. 1⅛ in. long. The fire-box of this engine is also Belpaire and it is copper, 97 in. long x 42 in. wide. The grate area is 27 sq. ft. and the total heating surface 2,036 sq. ft., with a working steam pressure of 180 lbs. per sq. in. The driving wheels are the same in diameter as those of the Dübs Atlantic-type engine. The Brooks consolidation engine has cylinders 20 in. x 26 in. with indirect-driven piston valves. The barrel of the boiler is 60 in. diameter and there are 260 brass tubes, 2 in. diameter and 14 ft. 7 in. long. The fire-box is copper, 97 in. x 42 in. wide and the grate area is 27 sq. ft. The total heating surface is 2,134 sq. ft.

The boilers of the 10-wheel engines are the same as those of the Atlantic-type engine, and the wheel-base is

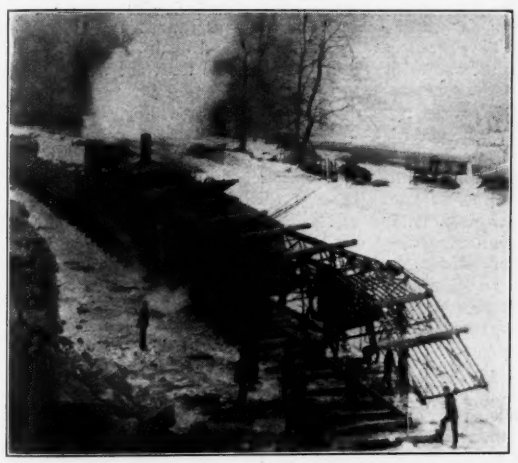
26 ft. 9 in., 14 ft. 7 in. of which is rigid base. The 10-wheel engines weigh about 67 tons in working order, about 18 tons being on the truck. The Dübs Atlantic-type engine weighs about 64 tons, and the consolidation engine weighs about 65 tons. The Brooks Atlantic-type weighs nearly 67 tons and the Brooks consolidation weighs about 65.5 tons.

The Hurley Track-Laying Machine.

The accompanying illustrations serve to give an idea of what the Hurley track-laying machine is like. It was used for the first time, laying a new piece of track on the Bessemer & Lake Erie, near Greenville, Pa.

The whole apparatus consists of a tender car, with boiler, fuel and water tank, standing on a raised platform, and a machine car 55-ft. long from the front end of which extends a 65-ft. steel cantilever truss. This truss is high enough above the rails to allow men to swing their spike mauls underneath. On the underside of the lower chord of this truss are two channels, one on each side, containing power rollers by which rails are moved forward, one at a time, to a point 25-ft. in front of the wheels of the machine car. Here they are grappled by properly constructed tongs and lowered to the ties. One man does this work. Ties are dropped 12-ft. ahead of the rails, and two men straighten them and lay them ready for the next pair.

The manner of feeding the machine and of working the whole train is very simple. From 14 to 16 ordinary flat cars are equipped with 3-in. iron rollers, one on each side, midway from the car ends. These rollers are just wide enough for a rail. Rails are loaded on the four rear cars of the train, and when the time comes, they are connected up one by one, and moved forward over the rollers. The connecting consists in simply inserting one



The Hurley Track-Laying Machine.

bolt in each end of the angle bars. The power-operated rollers of the machine car give motion to the whole string of rails moving them over the rollers, the entire length of the train.

Ties are loaded upon all the other cars, and the lower tiers of ties are placed longitudinally between the strings of rails. On top of these lower ties, other ties are placed crosswise, and the ends of the ties in the large pile on each car overhang the strings of rails. The object of this arrangement will be apparent when the work done on the forward cars is understood.

As the rails move forward, a length at a time, two men on the first car lay ties on top of a pair of rails. They put as many ties, roughly spaced, on a pair of rails, as will ultimately lie under them, in the finished road. The two rails carrying a spaced load of ties, are moved forward in turn, and the next pair are loaded with ties, and so on, length after length. The men engaged with the ties gradually working back over the train toward the men who are connecting up rail lengths at the rear.

In this way rails and ties move forward, step by step, to the rear of the machine car. Here the tie-laden rails pass under the raised deck of the tender car, which holds boiler, fuel and water. Arriving at the machine car, the rails move forward on the same level and out to the power rollers under the overhanging truss, and on, one length further. Here motion is stopped, the foremost rails are disconnected from those now standing on the power rollers, and are dropped upon ties already in place upon the ground.

The handling of the ties in the machine car is somewhat different, as the object is to finally place them 12 ft. ahead of the rails just dropped. When rails and ties enter the machine car, the ties are caught upon an endless chain and conveyed up an incline, to reappear on the top of the car. They then move out along the top chord of the truss, on to the descending incline, down which they slide, and fall to the ground ahead of the rails just laid.

The car moves itself, and all the cars containing material for the track. The cycle of the whole track-laying operation is, briefly; when a pair of rails is dropped on the ties, they are connected up so that machine car and train may move forward. While moving ahead, a second pair of rails are being drawn forward, and the requisite number of ties are moving out over the top of the truss, and falling to the ground, roughly spaced a little apart. Two men straighten these ties and place them level, and when the car has moved a rail-length ahead, it pauses for the next pair of rails to be disconnected and dropped upon the ties which have just been laid, and a few spikes are driven. It is in this interval that the men back on the tie cars, load up ties on the rails, and the men in the rear connect up another pair of rails. Rails and ties are thus constantly fed to the machine which lays them on the roadbed.

The power for all the operations is supplied by a pair of reversible stationary 100 h.p. engines which draw their steam supply from a boiler which stands upon the elevated platform of the tender car, with the coal and water supply. It is understood that Mr. Hurley, the inventor, intends to improve the track-layer by doing away with the tender and placing the whole of his "plant" on one car.

In the test made, no difficulty was experienced in moving 15 loaded cars up a 40 ft. grade, indeed the machine has power enough to handle all the material necessary for laying one mile of track. With from 30 to 35 experienced men, this machine will lay two miles of track a day. The work done on the Bessemer & Lake Erie was such as to test the capabilities of the machine, very thoroughly. The ties handled were of West Virginia oak weighing about 400 lbs. each, while the rails were 100 lbs. to the yard, and the train was made up of 16 cars. The machine was in use there about a month and did very satisfactory work. It is shortly to be shipped to Ohio for some construction work in that State.

Roadway.*

CROSS-SECTIONS.

Regarding Cross-Sections, stability is of primary importance in the design and construction of railroad roadbed. With the rapid increase in recent years in the intensity of moving loads to be sustained by railroad embankments, in weight and speed, as well as in frequency of train service, heavier track construction has been generally adopted; and in order to insure greater resistance to the shock of moving trains, it appears as if a more substantial embankment than that heretofore built on the majority of the lines is required, in order to properly and economically maintain the track in the condition necessary for the service expected. Stability of slopes in earth or kindred materials cannot be relied upon, where the angle of same with a horizontal plane exceeds the angle of repose for the particular material dealt with.

Good practice, in the opinion of the committee, prescribes a width of 20 ft. at top of embankments for single track, standard gage—that is, at sub-grade—and this width is approved and recommended by the committee for first-class lines with heavy and constant traffic. For double track, an additional width of 13 to 14 ft. Arbitrary widths of 18 and 16 ft., respectively, are also recommended for less important lines, varying according to the general loads and volume of traffic reasonably expected.

In the theory upon which the width of embankments at sub-grade is based, it is considered that the track in cuttings is placed upon what is virtually a low embankment, and in order to preserve uniformity of conditions immediately under the track throughout the line, the width of sub-grade in cuttings should be made the same as on embankments, outside of which sufficient room must be allowed for side ditches. In each of the classes of less important lines, where finances will warrant it, or where the excavation can all be used in embankments within reasonable haul, it is the opinion of the committee that such similarity in width is also the proper thing. In cases, however, where the immediate financial problem is a governing element, or else where a large amount of excavation is necessary, in order to get proper ditches, it may be entirely practicable to narrow up the roadbed proper in the cutting. Not, however, to a greater extent than to give two feet less in width than the top of a real embankment, and in such cases, the ditches should be turned off at the end of the cutting in approved manner, in order to prevent eating into the embankment. The capacity of side ditches should be sufficient to pass easily the greatest amount of water that can come to them; and wherever necessary to be widened, such increase should be made on the side of ditch furthest away from the track.

The principle in the crowning of embankments by making the top surface of two planes meet as a ridge in the center would undoubtedly be desirable, if it were practicable to maintain it in this form. For various reasons, however, it is difficult to preserve such a section on embankments, and few lines find such susceptible of economical execution in actual practice. It is doubtful if many of the roads which show this feature on their standard plans even attempt to carry it out in actual practice, and if they do it soon becomes obliterated. Shoulders being exposed to the elements, settle faster than the center, and those parts of the embankments will therefore, sooner or later, practically slope themselves. In cuts, however, where hard material is encountered, it would, no doubt, be an aid to drainage if the roadbed were sloped with a slight pitch, true on either side from ends of tie, leaving a horizontal bed for the tie itself previous to ballasting.

*An abstract of the report of Committee No. 1 to the American Railway Engineering and Maintenance-of-Way Association.

IMPROVEMENT OF GRADES AND ALIGNMENT.

It is within the province of this report to outline some general principles, of which a thorough knowledge may assist in determining the limit where the money to be expended for improvement of grades and alignment will yield the greatest return over the interest charges, and to aid in more easily deciding whether the amount of money allotted will be sufficient to obtain the results reasonably anticipated. In regard to tonnage rating in connection with grade revision, it is evident that co-operation is necessary between the active head of the department in which the determining of improvements is vested and the superintendent of the motive power department.

[The discussion of the considerations involved in the determination of grades and alignment has been printed as an article by itself. Editor.]

PRACTICAL WORK OF GRADE REDUCTION AND CURVE IMPROVEMENT.

In the practical work of grade reduction, after the type of engine to be used has been settled, the rates of grade permissible decided upon, and the extent to which momentum and equivalent grades may be used has been determined, the location of the new work is the important question. This subject resolves itself naturally into three classes: First—A new location far enough away from the existing line, to be treated as a separate line, and built according to the usual methods of construction independent of the old line. Second—Raising or lowering the existing line on the original right-of-way and alignment. Third—A combination of the first two classes mentioned, in each particular section of work under construction. The third class is by far the most usual, and generally the most economical way, for the reason that it takes advantage of all available existing work, and only takes to a new alignment where required.

The experience of the engineers of a prominent line on which a large amount of grade reduction and change in alignment has been done, has shown them, that in grade improvements made for substantial distances, it is better to build an entirely new line, and not interfere with the existing traffic in any way. That is, they appear to have succeeded in doing so for less money than by keeping the traffic moving over the existing line. A question of this nature, however, together with the extent to which an existing line may be disturbed, and traffic impeded, must of course be decided for each individual case; the governing elements being the density of traffic or frequency of trains, and the amount of saving reasonably expected from an intelligent comparison of the probable cost of each.

In the practical work of almost all grade improvements, the steam shovel is usually the most important factor, and the committee endeavored to bring out for this report such facts as might be of use to those contemplating such work. To this end a series of practical questions were framed and sent to the members of the Association in the form of a circular, and a brief digest of the answers received follows.

Character of Shovel.—Shovels varying in weight from 36 tons to 80 tons, and in dipper capacity, 1½ to 3 cu. yds., were respectively mentioned as desirable by various members, but the majority of the replies embraced opinions that a shovel weighing 65 tons, with a 2½-cu. yd. dipper, and at least 14 ft. clear height of dipper above rail was the most serviceable shovel for general railroad work.

Form of Shovel Track.—Lengths of 4 ft. to 10 ft. were mentioned as being used, but over 50 per cent. of the replies advocate a length of 6-ft. sections for shovel track, fastened together with tie bars, and the rails joined with short splices, with one or two bolts each. Many replies stated that they used keys in place of bolts, to fasten the short splices. A form of track mentioned has wrought iron chairs on the joint ties, into which the rail ends fit. No splices nor tie bars are used with this particular track, and it has the advantage, that a single piece of rail, say 6 ft. long, is the heaviest thing to handle in moving up.

Another form had the sections with tie bars resting on stringers 6 in. x 12 in., and the stringers resting on ties, and blocking as required.

Gage of Shovel Track.—Standard gage was recommended almost unanimously, generally because of ease of movement from place to place, and the ability to make use of tracks and sidings already laid. Two answers, however, recommended the 3-ft. gage, for the reason that cars were more easily handled on the dumps.

Form of Cars.—There is considerable diversity of opinion in regard to the best form of cars, but the majority of the replies indicate, that for rock or frozen earth, flat cars with aprons and stakes to be used with a plow, are the best. For trestle filling, center dump ballast cars were most approved; and for material which can be handled in them, side dump cars of from 14 to 20 cu. yds. capacity for use with plows, seem most favored. Only a few advocate the use of small 5 to 7-yd. dump cars. All the replies received, favor the use of aprons with all cars used with plows and cables.

Unloading Cables.—Unloading with plows and cables seems to be very satisfactory to practically all who answered our inquiries, but a majority considered that the use of an unloader, and not the locomotive, was required, in order to secure the most economical working. The length given of cable proper to be used varied from 400 ft. to 2,000 ft. General opinion seemed to be, that for use with the locomotive alone, 20 cars were all it was economical to handle at one time, but that with an un-

loader, 30, 35 or 40 cars, or whatever the locomotive could pull, were allowable in a train. Those favoring long trains, stipulated that the train length should be shortened on a crooked road, and all advocated the use of snatch blocks on curves.

Spreaders.—About 70 per cent. of the members who made reply, use some form of spreader or bank leveller, but there is great diversity in the kinds used. There are principally two classes of such spreaders. First—Those in which the wings open downward and outward, with hinges horizontal, and are handled either by a windlass or air pressure. Second—Those in which the wings fold against the sides of the cars, with a vertical hinge near the front of the car. In this class the wings may be adjusted for height. Some of the second named class are reported very effective, but are a little slow for getting out of the way of trains. Those of the first-named class, when operated by air from the locomotive seem the best, because of the ease with which they can be handled. For quick work in grade reduction, it is essential that they have wings on both sides.

New Embankment.—The committee has endeavored to ascertain between what limits various methods of making embankments were economical, such as raising the track on the filling material, the use of a central core put up by team work and widened with the shovel cars, the use of filling trestle, etc.

In raising track on embankments, it seems to be good practice to raise only about 9 in. at a time, if the traffic is at all heavy; and even with very light traffic, not more than 12 in. This method can, of course, be used to any height, but it ceases to be economical when a central core can be put up by team work, and all widening be done by shovel, without handling track so often. Where banks are to be over 15 ft. in height, the temporary filling trestle seems to be considered to give the best results.

Shrinkage.—There can, of course, be no uniform rule laid down for allowance for shrinkage, as the required amount varies so greatly with the material. Three to 10 per cent. is a fair range, and it is recommended that allowance for shrinkage be made in width, as well as in height of banks.

This report is signed by W. McNab, Asst. Eng. Grand Trunk Ry., Chairman; C. Dougherty, Roadmaster Illinois Central R. R., Vice-Chairman; H. J. Slifer, Supt. Chicago & North Western Ry.; H. Baldwin, E. M.-of-W. Chicago, Cincinnati, Cleveland & St. Louis Ry.; C. Frank Allen, Prof. of R. R. Eng. Mass. Inst. of Tech.; R. C. Barnard, E. M.-of-W., Pennsylvania Lines West; H. C. Phillips, Asst. Supt. Atchison, Topeka & Santa Fe Ry.; W. D. Pence, Prof. of Civil Eng. Purdue Univ.; J. T. Wilson, C. E., Pittsburg, Chicago & Western R. R.

DISCUSSION.

Mr. W. McNab, Grand Trunk: It will be noticed that the report has been prepared in three main divisions: first, "Cross sections of Roadway"; second, "Improvements of Grades and Alignment"; third, "Practical work of Grade Reduction and Curve Improvement." In order that the discussion be not scattered, I would suggest that it take place on these divisions in order. If anyone present desires to discuss the report and is not fully prepared to do so at the present time by reason of the late hour at which it reached you, it will be in order to transmit such discussion by mail, and it will be incorporated in the printed proceedings of the convention. The report should have contained at its close the following recommendation: "Resolved, (1) that this Association approves of the opinions of this committee that the first-class roads of standard gage, with constant and heavy traffic, a minimum permanent width of 20 ft. at subgrade is good practice. (2) That where the finances will warrant it, and where the excavation can be used in embankments within reasonable haul, uniformity in permanent width of sub-grade in cuts and in embankments is proper. (3) Local circumstances should invariably be taken into account in determining the angle of repose of any given material to be dealt with, and slopes should be varied to suit the character of the respective materials."

The resolution, No. 1, was adopted.

Mr. W. C. Cushing (Pennsylvania Lines West): I do not like the wording of the resolution as well as I do the paragraph from which it is taken in the report proper, which further supplements the statement by saying, "outside of which sufficient room must be allowed for side ditches." There is more trouble, as a general rule, in the cuttings than with the embankments, the drainage feature of which is the controlling one. Consequently, any narrowing up of the cuts is almost certain in all cases to be detrimental. I think, therefore, the provision in regard to the ditches being commonly outside of what may be considered as the ditch line, or sod line, or whatever line it may be called, is eminently proper, and one of which I am very much in favor. I do not like the paragraph in the report in which it advocates the narrowing up of the cutting to meet cases of economy. I think it is false economy. It ultimately results in greater expenditure for maintenance. I, therefore, am much in favor of the resolution standing as it does, with the addition of the other sentence in the report—"outside of which sufficient room must be allowed for side ditches." I would offer that as an amendment to the motion. Carried.

Mr. A. W. Johnston (N. Y. C. & St. L.): In this report of the committee there is a suggestion that where the finances will not warrant, they should not do a certain thing. The inference to be drawn from the phraseology of the resolution would be that where the finances would warrant it would be proper to do a certain thing. I would therefore move to strike out the expression, "where the finances will warrant it." We are endeavoring to lay down an ideal condition up to which it is hoped some time the average railroad will reach, if it has heavy traffic and fast traffic. We do not want to take the position that we should not do certain things, and we do not want to lay down an ideal which would not be proper under certain conditions.

Mr. H. G. Prout (*Railroad Gazette*): It seems to me that in this Committee's report we ought to try to free our minds from an inheritance that we have with us from past generations of railroad builders; that is to say, within a very few years the conditions under which railroads are built in this country have changed absolutely. To-day money is very cheap. You can borrow it almost for nothing, if you have good security, and we discover now that practically all of the railroads of the United States are being rebuilt. Therefore, it seems to me, we should put out of our minds the idea under which we have been working for a couple of generations now, of building our roads as cheaply as we possibly can, and we should start out on the proposition at this time that we should build as good railroads as we can; and that being so, I should be glad to have Mr. Johnston's motion prevail. I merely suggest this as being a sort of keynote or principle on which it seems to me we should proceed in dealing with this report: that is to say, we should cease to think of building as cheap railroads as we can, and get into the habit of building as good roads as we can, in order that our successors shall not have to rebuild them soon.

Mr. W. C. Cushing: Mr. Prout has well said that the work on railroads to-day, the great bulk of the work on railroads to-day, is the rebuilding of the present lines. We are not thinking of new lines, and they form a small part of the railroad work of the present time. This work is made up of the rebuilding of the present lines, and that is why this association was formed, so that we could gather ideas from each other and learn what each was doing in the rebuilding of his own line. We ought to bear that in mind in these discussions. There are very few of us that are chief engineers of new constructions, or interested in any new construction outside of small branch lines, but we are nearly all of us engaged to-day in endeavoring to improve the railroads that we are working for. This is predominant all over the country, and not confined to any one section; it is certainly predominant over the greater part of the country. I do not believe we should forget that that is what we are discussing, and not the building of new lines of railroad.

Mr. Johnston's amendment was carried. Mr. McNab then submitted a substitution for resolution No. 2, and a motion was made to accept.

President Kittredge: The resolution now as suggested by the committee is: (2) "In the theory upon which the width of embankments at sub-grade is based, it is considered that the rack, in cuttings, is placed upon what is virtually a low embankment, and in order to preserve the uniformity of conditions immediately under the track throughout the line, the width of sub-grades in cuttings should be made the same as on embankments, outside of which sufficient room must be allowed for side ditches." Carried. Resolution No. 3 was also adopted.

Mr. W. D. Taylor (Prof. of Railroad Engineering, University of Wisconsin): I would like to ask why it is that a shrinkage should be allowed for both horizontal and vertical, and would ask the Association whether or not there are any instances on record where an embankment settles horizontally? The uniform rule in regard to settlement is to allow too much fill and it tends to sink.

Mr. C. S. Churchill (Norfolk & Western): It seems to me that the recommendation of the Committee that the horizontal width be increased is a correct one. It comes in especially in filling up trestles and such work as that. You cannot change the grade of your track; you cannot raise it. You don't want to put a hump in the road, and the common sense way of handling the matter is to make the roadbed extra wide, about one foot in five is our experience and has been for years. The result of that is when the bank comes down you have the wide space on the track that allows you to raise up. It is a very simple matter to maintain your width when you have simply a small raise to make, providing you have the footing on which to get that raise, and the whole object in making the bank wide is therefore to get the width on which to make the slight raise. Therefore I think the recommendation would be complete if they would leave out the vertical and stick to the horizontal; make your bank extra wide but do not make it high, because you do not want to get a hump in your railroad.

Mr. McNab: I can quite appreciate Mr. Churchill's remarks in regard to the humps. Where you have short fills to make, you would be apt to get a hump in your track if you made the fill proportionately high, but generally speaking, where you have a long embankment, I think it is proper to increase both the height and the width.

Mr. E. F. Wendt (P. & L. E.): Under the head of "Cars" it should be understood that in the East, during the past year, we have had trouble in getting any cars at all for the construction department. They have all been in use hauling freight, and in our district we have resorted to the use of smaller cars than otherwise because of the shortage. About one year ago we purchased 100 steel flat cars, properly equipped with aprons, air-brakes and other appliances, and put them into the steam shovel service. They are equipped with sideboards and give excellent service. Under the head of "unloading" cables, machines, and so on, I wish to remark that a much larger and stronger unloader is now on the market; the old Lidgerwood unloader having been a 25-ton and the new one a 60-ton. Our unloader has broken down several times this past winter and each time we found it necessary to assign 100 laborers to take care of the work which that machine did, that is entailing an extra expense on it of $125 or $150 per day.

Mr. F. H. McGuigan (Grand Trunk Ry.): I just want to say a word in answer to Mr. Wendt. I am sorry he admitted that when the Lidgerwood unloader broke down he had to put 100 men in its place, instead of substituting his locomotive.

Mr. Wendt: I am very glad to accept the criticism. As we did not have any locomotive for that purpose, the locomotives being what are called "teapots," I could not do as suggested.

Mr. McGuigan: I think the gentleman again displays his lack of knowledge on the subject. Load the cars lighter.

Mr. Cushing: I think, Mr. McGuigan, they are not making locomotives powerful enough to-day to unload a train of cars that could be unloaded with a Lidgerwood machine.

Mr. McGuigan: I would like an explanation of that statement. I have been doing this sort of work 30 years, and up to two years ago I never knew what a Lidgerwood unloader was. We managed before we had the rapid unloaders, to unload the cars with the same quantity of load, and I claim it is entirely possible, with an ordinary 17-in. cylinder engine to unload any ordinary flat car with seven or eight yards of material. I unloaded possibly last year two or three thousand yards, without either the big engine or a rapid unloader.

Mr. Cushing: The explanation is simple. The cars can be loaded so much heavier to-day with the Lidgerwood machine that the locomotives cannot unload them. I have demonstrated that time and again. I don't say with sand or gravel or anything like that, but with heavy clay and rock.

Mr. McGuigan: I have been unloading that same kind of material. I do not think it is necessary to substitute 100 men if one breaks now. I think you can do it with the engine. The exercising of a little intelligence in the unloading of cars will make that possible.

Mr. E. H. Lee (C. & W. I.): I understand that the use of the Lidgerwood unloader and plow cars have been very satisfactory in unloading with sideboards of about 3 ft. I would like to ask if any member has had satisfactory experience in using a side plow on cars having the capacity of perhaps 25 or 30 yds. I have frequently used the side plow for unloading a flat car with a sideboard of perhaps 10 or 12 in., which could be removed from one side. I have information which I consider reasonably reliable that the use of a center plow for unloading practically a gondola car would be impracticable. The particular information which I desire is whether any member has had experience in that particular line, as to the possibility of unloading a gondola car with swinging sides, with a side unloading plow.

Mr. H. F. B. Baldwin (C. & A.): We use Haskel cars and we have unloaded them with the side plow. We could not load them to their full capacity. We loaded them with possibly 15 or 20 yds. instead of 25 or 50 yds. The material was very sticky clay, and broke off the sticks. We had a great deal of trouble in the sticks breaking off, but that was because of the character of the material. If it were gravel or sand we would have had no trouble, and could have easily handled the full capacity of the cars with the side unloader.

Mr. E. E. Hart (N. Y. C. & St. L.): In the summer of 1896 I put in the fills in Nebraska City. We put in 200,000 yds., and we had no difficulty with the side plows. The first two days we had trouble, but we lengthened the guide on the side plows 8 or 10 ft., so that the plow in making its transit into the material held steadily, and we had no trouble whatever. This summer we intend putting in a large fill, and we have used the Lidgerwood unloader. We have been putting in 20 to 30 yds. to the car to hold our trestles in shape. The material being wet quicksand or very fine sand, mixed with clay.

The Morgan Ship Syndicate.

The terms of agreement entered into between the Morgan Ship Syndicate and the British lines involved, have recently been made public. They are known as the provisional agreements for the purpose of the acquisition on or before Dec. 31, 1902, of the White Star, Dominion, American and Atlantic Transport lines, to be organized under the direction of the vendors to the satisfaction of the bankers (i. e., the Morgans) under the laws of New York, or such other State as shall be selected. The vendors, Ismay, Imrie & Co., Mills & Co., and Messrs. Widener, Griscom and Baker, receive in return for their entire capital stock holdings $120,000,000, half of which is 6 per cent. cumulative preferred stock, and half common, with a 10 per cent. limitation, and also $50,000,000 in 4½ per cent. collateral debentures. This sum is inclusive not only of ships afloat but also of ships building.

An interesting feature of the arrangement is contained in an additional paper called the Builders' Agreement, in which it is specified that Harland & Wolff, of Belfast, shall receive all orders for new ships and for all heavy repairs

done in the United Kingdom, but it is stipulated that nothing in the document shall prevent the purchasers from placing orders for new steamships and repairs at ship yards in the United States. Harland & Wolff make a corresponding agreement to build no ships for firms outside the consolidation except for the Hamburg-American Packet Co., provided only that the orders of the syndicate keep the works fully and continuously employed. Harland & Wolff also receive from the syndicate an extra commission on the cost price which varies from 5 per cent. to 15 per cent. This agreement lasts for 10 years.

The valuation of the Atlantic Transport Line and the American Line is placed at the lump sum of $34,158,000, against which the American Line's $19,686,000 5 per cent. bonds are a liability. The valuation of the Leyland Line is placed at $11,736,000. The agreement is in the form of an option which permits the syndicate to take or refuse any line of which less than three-fourths of the interest shall be delivered by Dec. 31, 1902, the exclusion of one line not to affect the agreement with the others. Other clauses of interest in the agrement are the following:

"Inasmuch as the company is English and domiciled in England, all questions concerning the sellers arising under or pursuant to this contract shall be controlled or decided by English law. [White Star]."

"All questions, in case of dispute, are eventually to be decided by Price, Waterhouse & Co., the London accountants."

"Ismay, Imrie & Co. bind themselves not to undertake any kind of shipping business for 14 years."

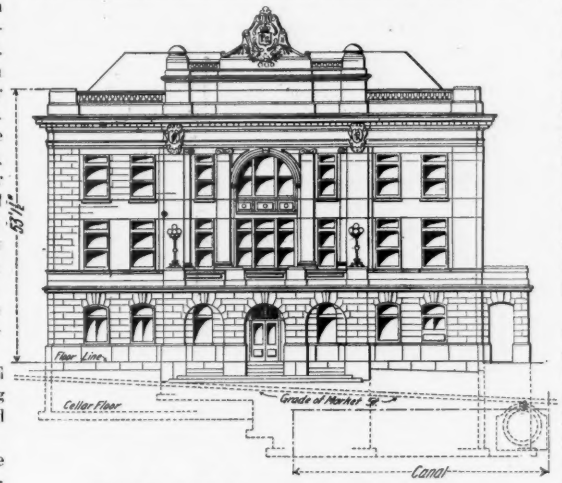
"The sellers promise to use the influence of their votes to cause the present directors to resign after the completion of the purchase." [Dominion].

Reading Passenger Station at Harrisburg.

The accompanying engravings show the main features of a new passenger station, which is being built for the Philadelphia & Reading at Harrisburg. The main building will be 83 ft. wide by 152 ft. 6 in. long, with covered cement platforms 300 ft. long for four tracks. The station will face on Market street, west of Tenth street, adjacent to the new freight house, now being built.

The front of the station will stand 50 ft. back from Market street and will have a curved driveway entrance with porte cochere. The waiting room will be 78 ft. wide by 50 ft. long. It is 50 ft. in height, with dome ceiling. The plans show a restaurant, a baggage room, an express office, toilet rooms, a women's retiring room and a smoking room. The waiting room, vestibule and toilet rooms will be finished with tile flooring and quartered oak finish throughout. The waiting room will be wainscoted with marble. The front portion of the building will be three stories in height; the second and third floors to be used for the company's offices. The entire structure will be heated by steam, both direct and indirect radiation being used.

The exterior of the station will be finished in Indiana limestone, light brick and terra cotta, of very ornamental design. The building will be roofed partly with slate and partly with slag roofing.



Harrisburg Station—Market Street Front.

Some Reasons for the Organization of an Air-Brake Department.

Mr. Robert Burgess, in a paper recently read before the Richmond Railroad Club, on the "Organization of the Air-Brake Department," pointed out that one general inspector in such a department, during the first year of his service, reduced the number of slid-flat wheels, sufficiently to pay for his salary four times over.

In speaking, during the discussion which followed, he emphasized the fact that the great necessity for constant and systematic air-brake repair work, had not been in the least over-estimated; he instanced a 50-car train he had found in his investigations, where the train pipe pressure dropped from 70 lbs. to nothing, in ten minutes, owing to train pipe leakage. In another case, out of a string of 25 cars, 80 per cent. had leaky hose couplings. In the same string of cars, 25 per cent. refused to apply, because the triple valves were dirty and did not charge the auxiliaries in a reasonable length of time.

The time that inspection takes, or should take, is a very fruitful source of contention, as a rule, between the mechanical and the operating departments on a railroad. In this connection Mr. Burgess' plain statement of the way he himself made a timed inspection of a freight train, is not only interesting, but instructive. He says: "I inspected a train of 28 freight cars in January during a heavy sleet—in fact, it was sleeting while I was doing the inspection. We coupled the engine on to the train, started the 9½-in. air-pump, and I went back from the engine and took the number and initial of each car, saw that the cars were cut in, grabbed the angle cock and attempted to shake it, to see if the train pipe was secure at each end, listened for leaks under the train, and if I saw anything I made a note of it. I got to the rear end and gave the engineer the signal to apply brakes, and then I walked up, and noted the piston travel, throughout the entire train, putting that down opposite the number of each car. I then gave the engineer the signal to release brakes and walked to the rear end of the train again, and when I got through, I had consumed 38 minutes. Put two men on that work, and they can do it in about half the time and yet do all the writing; eliminate the writing and it knocks off quite a little figure further."

In the matter of leaky packing rings in triple pistons, the speaker said that on a test which he wished constantly to make, a special valve had to be invented. This valve is put in the air-brake testing plant in the yard, and is coupled directly to the brake-valve itself, and when the ordinary train test has been made, the inspector charges the train to 70 lbs. throughout and equalizes the pressure; he then makes a 10-lb. reduction on train pipe pressure and cuts out the brake-valve and cuts in this newly invented "by pass" valve," which automatically feeds from 60 to 70 lbs. in one minute, irrespective of the length of the train or the leakage from the train pipe.

A test of seven cars, showed leakage so bad that train pipe pressure fell from 75 to 65 lbs. in one minute. On a 34 car train, the leakage was sufficient to reduce pressure from 70 to 67 lbs. in one minute. After a 10 lb. reduction with brake-valve, it was cut out, and the by-pass valve cut in, which fed train pipe pressure 60 to 70 lbs. in one minute and ten seconds. If a triple valve sticks, or fails to release, in this test that triple valve must come off, and must be replaced by a perfect valve. In the seven car test, none of the triples stuck, but in the 34 car train 11 triples failed to release. This test gives an opportunity for an inspector to "draw the line" which must be drawn somewhere, as to which triple valves to take off and which to leave on the train, as far as leaky packing rings are concerned.

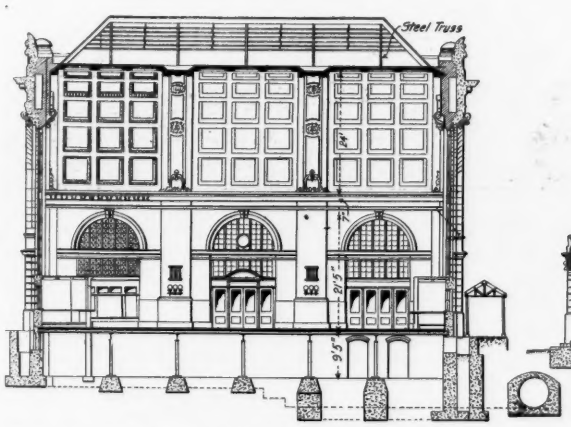
In further continuing the discussion Mr. Huntley said that at Clifton Forge, on the Chesapeake & Ohio, an air-brake plant was recently installed in which a 55-car train can be charged from 0 to 70 lbs. in three minutes, and after coupling up the engine, a train is ready to leave in six minutes, which includes making the regular test of brakes. He also explained that the regular 30-minute inspection of trains is made before they are ordered for the road. Charging the trains is to save yard delay, which, in the old way, extended from one hour to one hour and 30 minutes.

The Use of Steel in Car Construction.

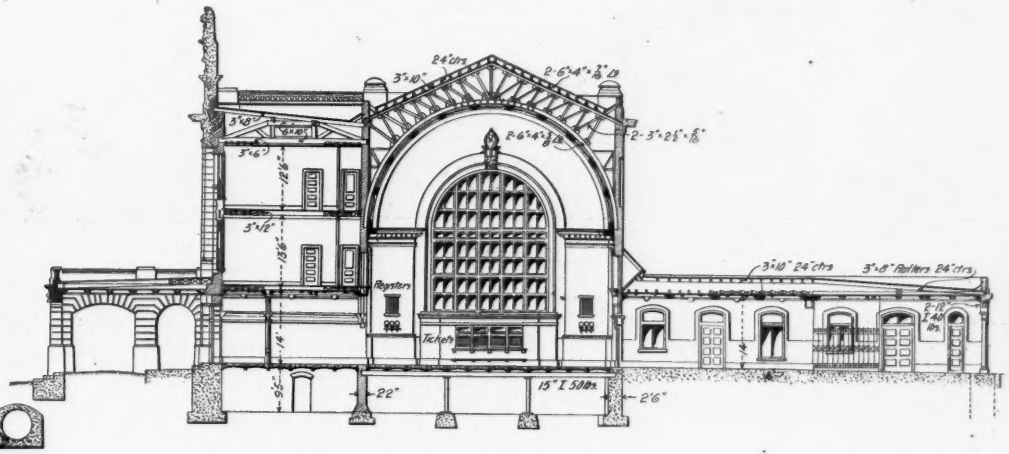
At the April meeting of the St. Louis Railway Club a paper was presented by Mr. J. W. Stokes having the above title, and from which we take the following:

The greater availability of lumber as compared with steel, has thus far prevented the general use of steel in car bodies, and immense quantities of large capacity cars, whose bodies are composed of wood, have been added to the equipment of the railroads during the past two years; and judging from the large orders already placed, the addition will continue for an indefinite period, forcing the retirement of rolling stock of smaller capacity or restricting its use to branch lines.

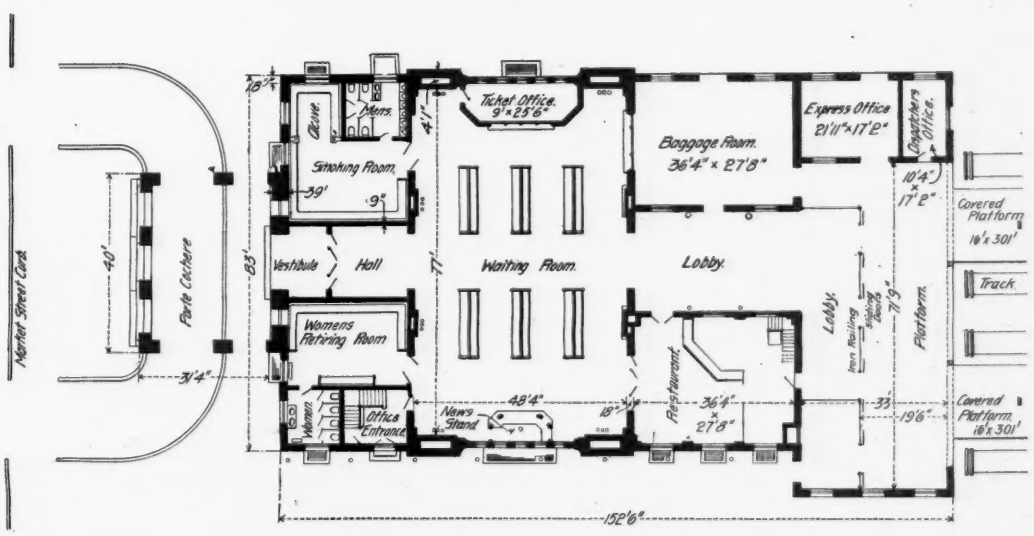
In order to give the required additional strength to wooden cars of greater carrying capacity, eight sills are now used instead of six, as was the general practice when 40,000 capacity marked the limit. The sills are made of larger section and end sills are also made of larger proportions; the number of truss rods has also been increased from four to six and sometimes eight in number, and from 1 in. to 1¼ in. and sometimes 1⅜ in. in diameter, and the depth of the truss is usually increased. The chief strength of a box car built of wood must always be in the underframe, and the above additions to sills and trussing have been added and increased with this object in view. This has resulted in increased weight of cars so that the proportion of dead weight has about kept pace with the increased tonnage capacity.



Transverse Section, Looking Toward Train Shed.



Longitudinal Section.



Philadelphia & Reading Station at Harrisburg.

The increased sizes and length of longitudinal sills of long leaf pine has made the selection of longer timber necessary and must result in a much smaller percentage of native lumber being available for use in car building, and while the present conditions of business have tended to prevent the general introduction of steel in car body construction, the conclusions clearly shown by the requirements of traffic are, both from the increasing scarcity of timber and the development of steel-making and its suitability, that it must soon become the exclusive material for car-body and underframe construction.

Within a short time we have seen the wood body-transom, the wood truck-bolster and the spring or sand-plank disappear and have seen steel substituted with the most satisfactory results possible. From the earliest days of railroad operation, efforts have been made to substitute pedestal trucks composed of composite steel forms and many of them are in use, but there is now a revival of and recurrence to the original diamond frame, the merits of which have become so evident that they have passed beyond the stage of argument.

Up-to-Date Tools for Railroad Work.

"Tools are not up to date when there is something else on the market which will do more work, or do it at less cost for labor." Such is the definition of what a modern machine tool really is, which was given by Mr. M. K. Barnum, of the Union Pacific, at a recent meeting of the Western Railway Club, and a few examples illustrated the truth of what he said.

A certain railroad shop, before it was equipped with a horizontal boring machine, did such work as boring driving brasses, rod brasses, rocker-boxes, air pumps, etc., in lathes, milling machines or drill presses. After the installation of the horizontal boring and drilling machine, a No. 2½, with a 4 in. bar and latest attachments, 18 months' use showed the saving effected. Original cost of machine $1,696; average saving per year over old methods of doing work, $900; interest on investment, 53 per cent. That means that in one year, 10½ months the machine would have just about paid for itself.

The Traveler Used in Erecting the Rio Hondo Bridge.

An old car wheel borer, replaced by a new, heavy 42-in. borer, with hub-facing attachment and power crane, which cost, installed, $1,710.90, saved $2.45 per day, or $735 per year, which is equivalent to 42½ per cent. on the investment. Two years and four months' service would see its first cost back in the railroad company's treasury.

A new heavy double-head car-axle lathe, costing, to buy and place, $1,665, with heavier cut and heavier feed, saved $250 per year, or 15 per cent. on the principal.

Mr. Barnum in his paper on Up-to-Date Tools, showed how a universal milling machine is away ahead of slotters, shapers and planers for certain operations, especially where a large number of duplicates have to be made. Tools, he says, need not necessarily be worn out, to be wasteful, by comparison with others. A pneumatic ram, made at a cost of $168.55, and used for breaking staybolts, when removing worn-out fire-boxes, earns very large interest on the outlay it necessitated at the beginning. It formerly cost $45.60 to cut the crown and staybolts out of a ten-wheel locomotive with a 9-ft. fire-box, employing three men. The pneumatic ram dispensed with the services of one man and so saved $30.40 on each fire-box. If only one fire-box was cut out each year, this tool would pay usury to the amount of 18 per cent. on the investment. The shop in question, however, applies about 30 new fire-boxes per year, which amounts to a saving of $912. These figures appear almost comic, when it turns out that with 30 fire-boxes per year this pneumatic ram pays in hard cash 541 per cent. per annum on the amount expended to produce it.

A point brought out in Mr. Barnum's paper, and emphasized in the discussion which followed, was that over and above the saving effected directly on the cost of installation, by the operation of up-to-date tools for railroad work, is the reduction of the number of days required to put an engine through the shop. A certain shop, by the addition of only a few modern tools, reduced the average time for each engine from 34 to 30 days on 160 locomotives. This is equivalent to 640 days for one engine. At the nominal locomotive rental of $10 per day, the annual saving represented $6,400. It is probable that had the entire shop been made thoroughly up to date, according to Mr. Barnum's definition of that term, the figure representing the yearly saving would have had something of the highly satisfactory quality which the pneumatic staybolt breaker introduced into railroad shop economics.

Mr. R. T. Shea, of the C., B. & Q., pointed out, in the discussion of this "up-to-date" paper that formerly it had been a question of getting tool steel to stand the cut and feed the tools were able to stand. To-day the question is to get a machine that will pull the cut that the tool steel will stand. The common sense of the up-to-date idea in shop tools was further insisted upon by Mr. Shea, when he said: "It is a well-known fact that these heavy engines (which we have been buying) will not stay out of the shop as long as the lighter ones, and that the work on them is very much heavier than on former engines; that the average railroad is away behind in shop facilities, and the management will sooner or later have to realize that they cannot continually increase the number and size of engines, without a corresponding increase in shop facilities, and that in considering requisitions for new machinery this matter should be taken into account, the mere fact of having what appears to be a large shop with a number of tools will not keep engines in repair to pull trains over the road." In other words the Army Service Corps must be able to keep the combatant force fully equipped and supplied, it must keep the army in the field. Up-to-date railroad equipment can best be maintained by up-to-date facilities for maintenance and operation, and the dollar and cent value of being "modern" is not easy to overestimate.

Rio Hondo Bridge—San Pedro, Los Angeles & Salt Lake Railroad.

We have from time to time mentioned the progress of the work on the San Pedro, Los Angeles & Salt Lake R. R., which is being rapidly built. Mr. H. Hawgood, Chief Engineer of that company, has sent us the accompanying illustrations which show one of the bridges—that across the Rio Hondo about 10 miles from Los Angeles. It consists of four deck spans each 60 ft. in the clear, of plate girders on concrete piers, with two 30-ft. concrete arches, one at each end. The girders were erected by a car derrick, the first girder being put into place April 1, the eighth and last girder April 10. The derrick has a working capacity of 30,000 lbs., hung at a point 35 ft. ahead of the car. The illustration shows the derrick on its way to the site of the bridge, with one of the 62-ft. girders (60-ft. clear span) weighing 24,000 lbs. suspended clear of the track. The derrick was built on two ordinary flats of such material as happened to be on hand.

The Rio Hondo Bridge—San Pedro, Los Angeles & Salt Lake R. R.

The company's next important steel work will be a bridge across the San Gabriel River, which will consist of three truss spans of 110 ft., and one plate girder span of 60 ft., all on concrete piers. Work of erecting the trusses has just been begun. The steel work for the bridges is contracted for with the American Bridge Company, and the work of erecting is being done by the railroad company.

Railroads in China.

A report is received of the foreign trade of China for the year 1901, published at Shanghai, and compiled by F. E. Taylor, Statistical Secretary, by order of the Inspector-General of Customs. It contains a summing up of recent conditions on the railroads. The Shantung Railway had 160 kilometers completed at the end of the year, and trains were running between Tsingtao and Tsoshan. This spring it is expected to reach the Ma-ssu coal mines, and should be completed as far as Chi-nan-fu, the capital of the province, in three years. The Imperial Railways of North China, between Peking and Tientsin and Newchwang, with extensions to Chinwangtao, and from Feng-tai to the Lu-Han Railway, and extensions to Tung-chou and Hsin-min-tun, have 901 kilometers completed. The short line between Shanghai and Woosung, 18 kilometers, is said to be paying its way now, but nothing has been done by way of commencing the projected railroad from Shanghai to Soochow, Ningpo, etc., and it is understood that there is some difficulty in raising the necessary capital, owing to the terms of the concession not being considered satisfactory by investors.

The trunk line from Peking to Hankow makes steady progress, and the influence on trade should be felt immediately. During the year the section between Lukouchiao and Pao-ting-fu, destroyed by Boxers, was rebuilt, and the line has been carried down to Cheng-ting-fu, distant from Peking 262 kilometers. In 1902 it is hoped to complete the line as far south as Shun-te-fu, a further distance of 125 kilometers. In the south, at the end of the year 175 kilometers northward from Hankow was completed, and trains will be running as far as Hsin-yang (220 kilometers) about the 1st of May. By the end of the year it is hoped that the track will be laid for another 100 kilometers north of Hsin-yang. It is intended to commence work shortly on the line from Wuchang to Canton.

The Baker Street & Waterloo Electric Railway.

This London electric "tube" undertaking for which Mr. Yerkes and his Metropolitan District Electric Traction Company recently paid £360,000 is being pushed forward. One tunnel had a few weeks ago been entirely driven through from Waterloo to Oxford Circus, and the other tunnel from Waterloo was within measurable distance of Oxford Circus. It is not expected that the railroad can be at work for a couple of years owing to time required to erect and equip the generating station.

Several interesting papers on railroad tunneling operations have been brought before the Institution of Civil Engineers, and one has had special reference to this particular work. The author was Mr. A. H. Haigh and his title "Subaqueous tunnelling through the Thames Gravel: Baker Street & Waterloo Railway." The following is an abstract of his remarks:

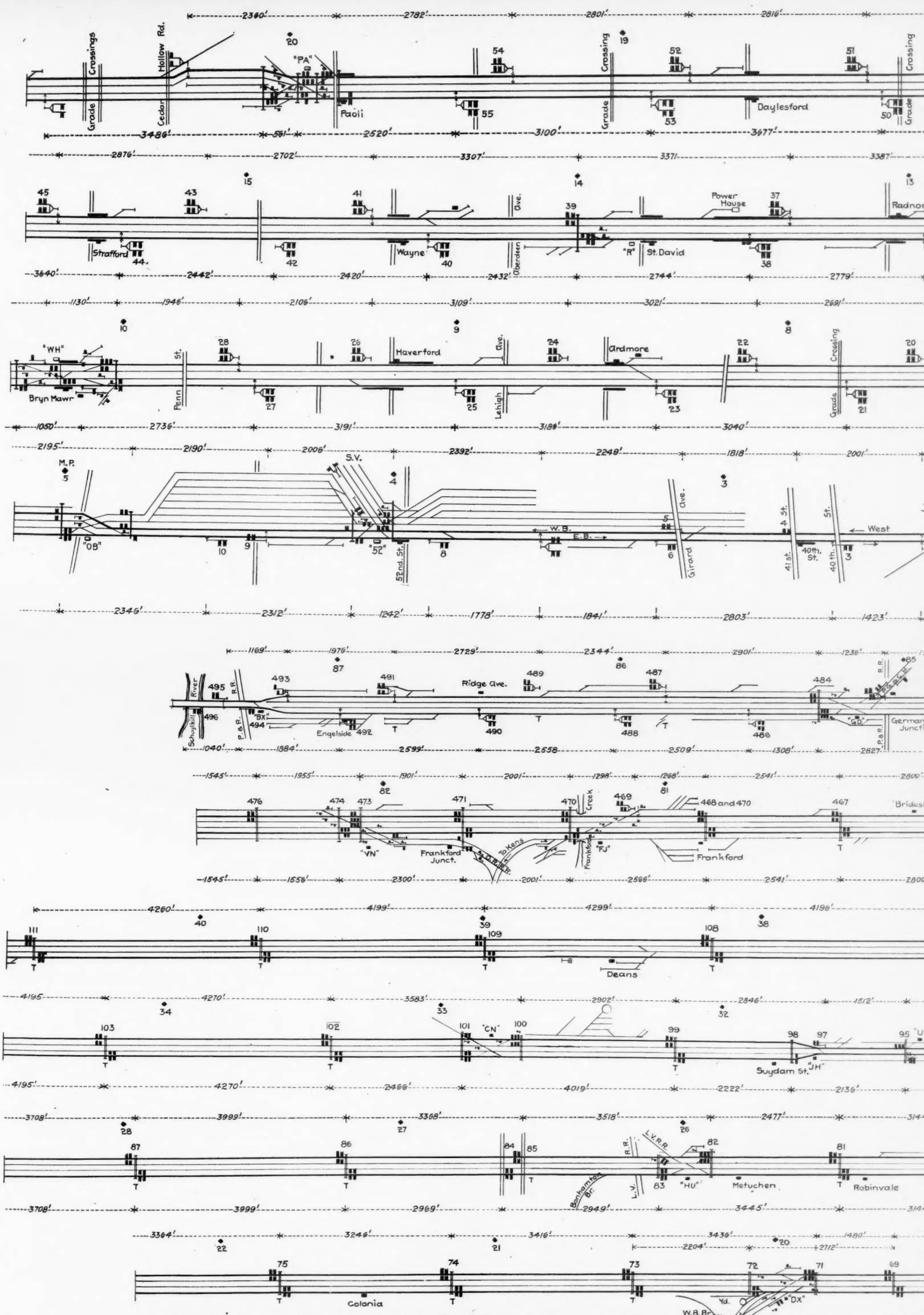
In passing beneath the Thames the tunnels, elsewhere wholly in London clay, encountered a bed of clean gravel and sand, lying in an abrupt depression of the clay surface. This water-bearing bed necessitated construction under compressed air. The two tunnels ran parallel and on the same level for a short distance under the river from the Victoria Embankment, after which the east tunnel had a rising gradient of 1 in 111, and the west tunnel a falling gradient of 1 in 107 towards the south side of the river. On passing under College street the up tunnel was vertically over the down tunnel.

The temporary stage, from which the working-shafts in the river had been sunk, was on piles, parallel with the Embankment and 150 ft. away from it. A stage, 370 ft. x 50 ft., held the contractors' plant and necessary buildings. Two 16-ft. shafts having been sunk, tunneling northward had been begun from one of the brick chambers at the bottom in February, 1899; but southward the river work had been begun in March, 1900.

The shield for tunneling through the gravel was provided with a hood in front to cover the men during excavation, and a fountain trap behind, to afford an air-seal against a horizontal water-surface, should a run of water at the face threaten flooding of the tunnel. Under the forward top screen of this trap, which was close behind them when working, the miners could escape in case of necessity. The appliance had proved perfectly successful in accomplishing its purpose. Laterally the shield was divided into two halves, ahead of the trap, by a vertical girder, which enabled a limited face in one half to be attacked, after any accident to the face-planking due to a "blow." The other essential features of the shield were a steel cylinder, stiffened by a circular box girder in rear of the hood, and having behind that a strong ring of cast iron carrying fourteen hydraulic rams. The cylinder extended behind the ram, forming a tail in which each tunnel ring was built. The iron lining for the 12-ft. tunnels consisted of rings 18 in. in width.

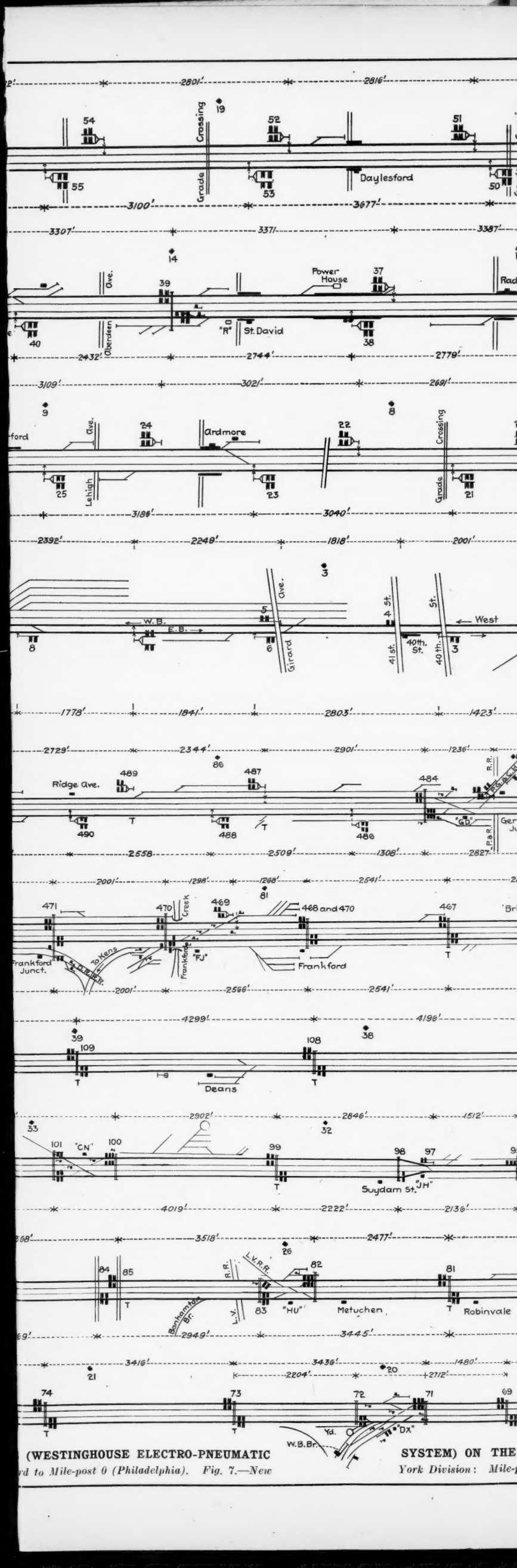
Tunneling towards Waterloo had been begun at the shaft with 17 ft. of solid clay and 34 ft. of total cover beneath the river bed. In April, 1900, the 8-ft. solid air-tight diaphragm-wall of brick in Portland cement mortar, had been built across the tunnel and grouted under pressure, with the working air-lock and an emergency lock through it, and all necessary pipes. When the clay cover of the shield was only 5 ft. thick, the box heading in advance of the shield had been discontinued. Compressed air had then been applied with 5 ft. of clay cover, and at a depth of 18 ft. below the river bed. As soon as the cutting edge reached within 2 or 3 in. of the ballast, pockets of pugged clay had been made, close to each other, in advance of the face, forming a soft bed for the skin to enter wherever the cutting edge would otherwise have encountered the ballast. As the amount of ballast face increased, the handholes, separately excavated and filled, had formed a larger and larger portion of an annular bed in front, a close blanket against the shield-skin behind, and a lining to the ballast over the iron tunnel, securing a space for the grout around the iron, and an air-seal at the tail of the shield where it covered the last tunnel ring. The face had been timbered with close horizontal planking set against a thick plaster of pugged clay, and arranged by stretchers in two halves, across the face, held at first against the shield, and afterwards held by up-and-down soldiers, supported by round hollow steel struts passing through the shield, when driving the shield forward. The normal progress of the tunnel in ballast had been three 18-in. rings per day. Three 8-hour gangs had been employed. The air-pressure used had been the exact equivalent of the hydraulic head in the river, varying, usually, during each tide, between 24 lbs. and 32 lbs. per square inch.

The East Tunnel had since been driven through the ballast by the use of the same shield, with a slight modification to



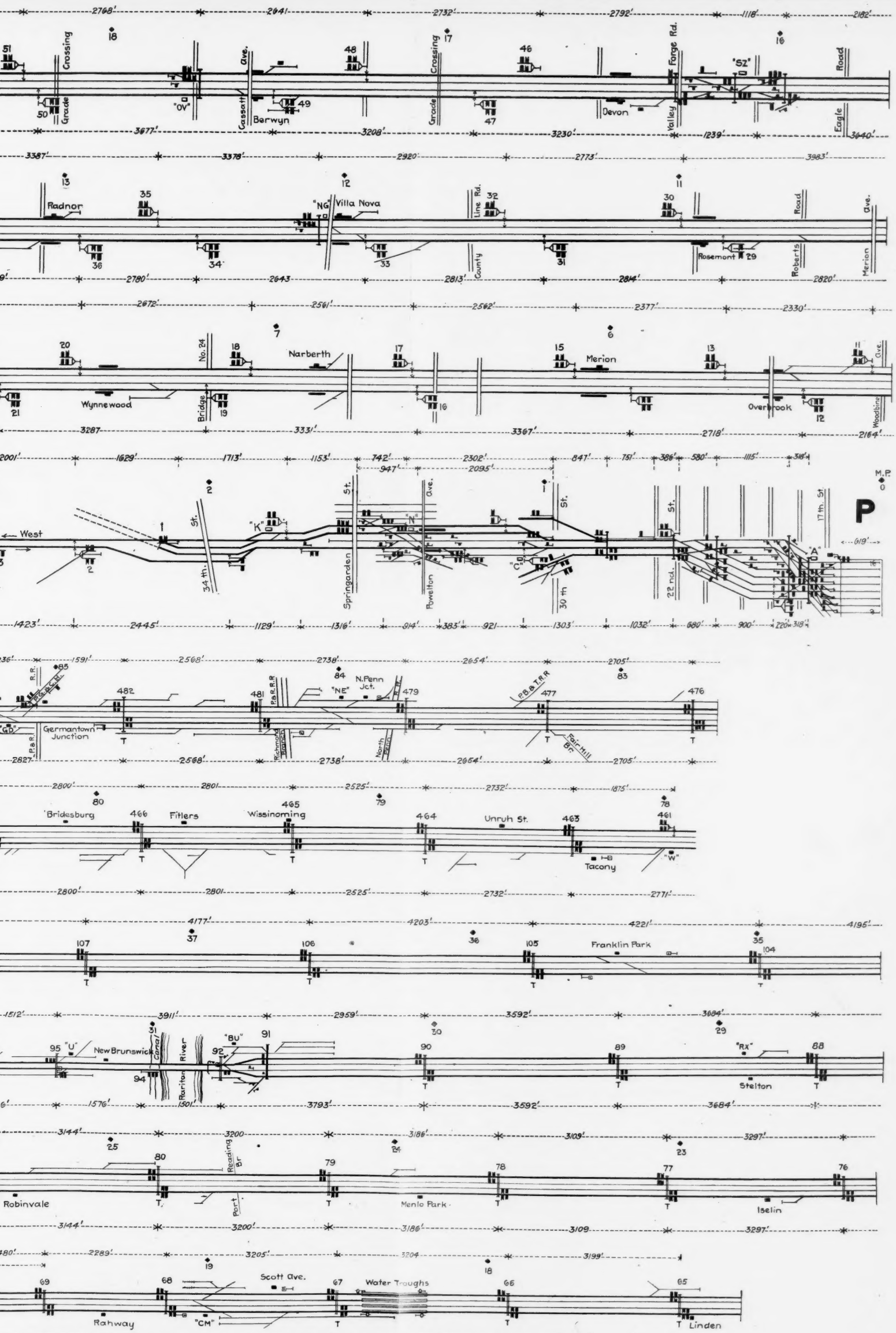
FIGS. 1 AND 7.—AUTOMATIC BLOCK SIGNALS (WESTINGHOUSE ELECTRO-PNEUMATIC SYSTEM) ON THE PH

Fig. 1.—Philadelphia Division: Mile-post 20 (Paoli) eastward to Mile-post 0 (Philadelphia). Fig. 7.—New York Division: Mile-post



(WESTINGHOUSE ELECTRO-PNEUMATIC SYSTEM) ON THE

rd to Mile-post 0 (Philadelphia). Fig. 7.—New York Division: Mile-



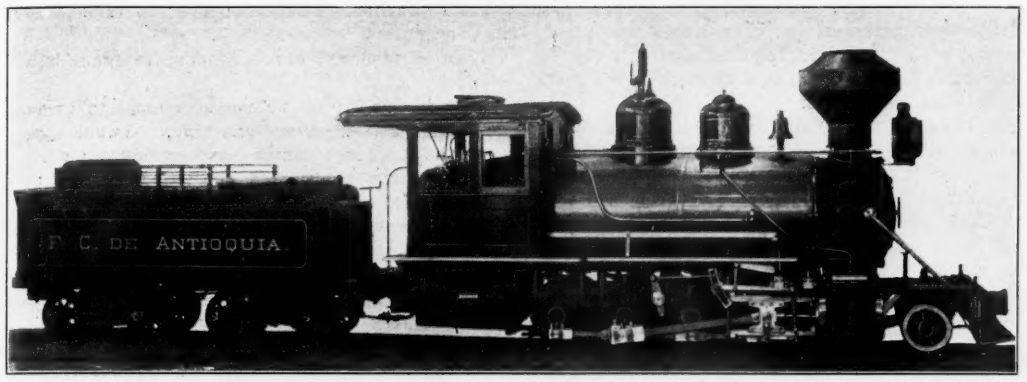
ON THE PHILADELPHIA AND THE NEW YORK DIVISIONS OF THE PENNSYLVANIA RAILROAD.

on: Mile-post 87 (Schuylkill River) eastward to mile-post 78 (Tacony); m.-p. 40 (Deans) eastward to m.-p. 18 (Linden).

enable the miners to work conveniently while the face was kept altogether under cover of the hood. An average progress of over 5 ft. per working-day had been uniformly maintained, and the amount of air delivered had averaged only 100,000 cu. ft. per hour.

Standard Freight Locomotives of the Colombian Government.

The illustrations show the new type of freight engines adopted as standard on the Government Railroads of Antioquia, Colombia, South America, for heavy freight service. The general design is by the Baldwin Locomotive Works, builders, modified to suit the conditions of service and repairs. These engines are designed to work on narrow (36 in.) or meter gage (39⅜ in.) by putting the driving wheels inside or outside of the frames as required. A part of the system is narrow gage, and a part meter gage.



Baldwin Locomotive for the Colombian Government Railroads.

The fuel is very poor wood, the fire-box is exceptionally large, and because of the heavy grades encountered the boilers are correspondingly large, as may be seen in the illustrations.

The principal change from the regular design is in the valve gear, which is a modification of the Walschaert gear, designed by Mr. F. F. Whittekin, technical director of the roads. The first locomotive to have this valve-gear was equipped in the Puerto Berrio shops in Colombia, and the arrangement is said to be a favorite with locomotive engineers. Experience with it shows it to be convenient for adjustment and repairs, and that it is economical in the use of steam at slow speeds and "fairly so for high speeds." All of the valve-gear being thus brought out from under the boiler allows the boiler to be set lower than usual, and the outside frames give the engines stability. A very low center of gravity with a minimum of oscillation on the springs is the result.

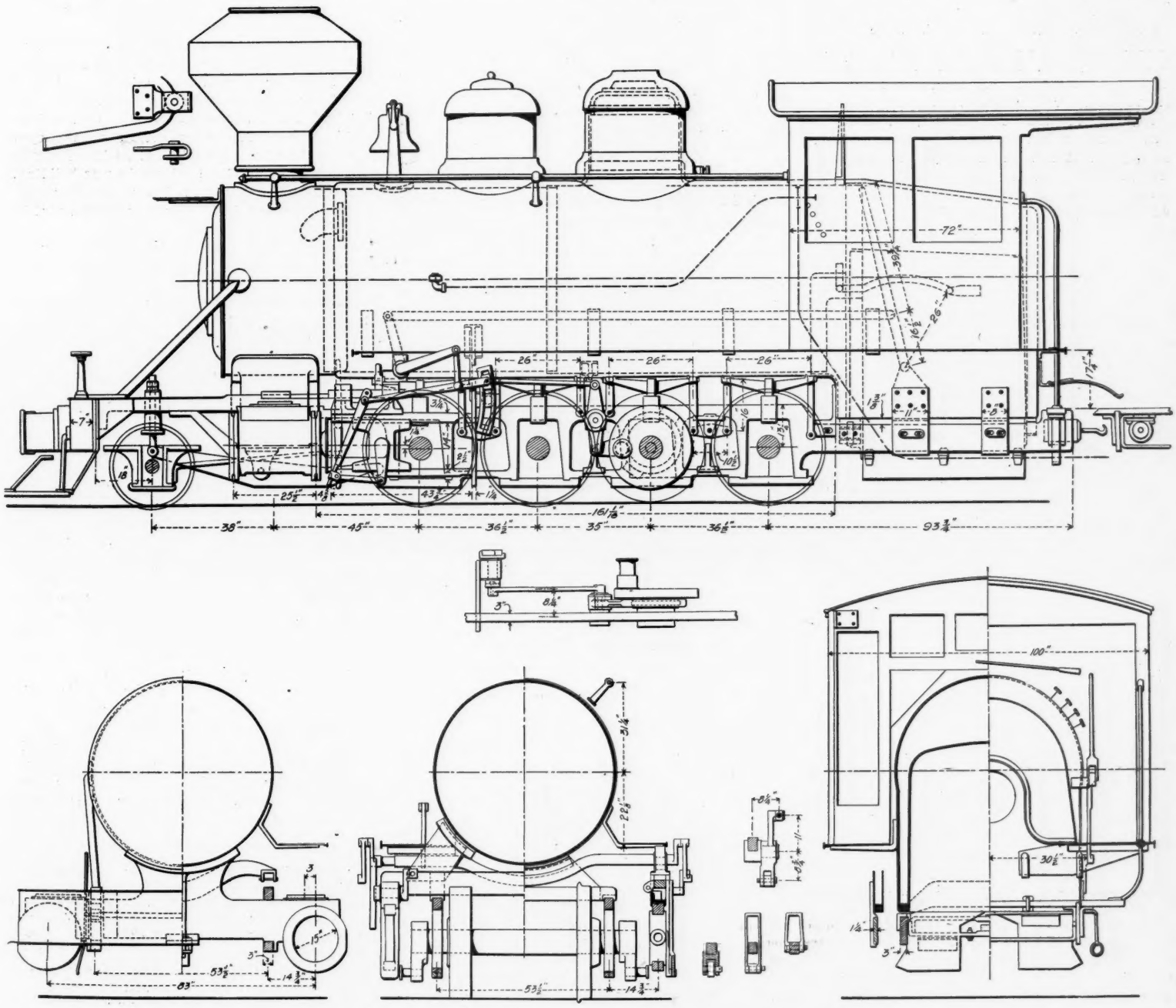
The eccentric is cast solid with the main crank, and is connected to a walking-beam which brings the parts up to the proper height for connection to the valve stem. There connection is made with the lap-rod from the cross-head. The lap-rod is adjustable, making it possible to vary the lead. The link (reversed) is attached to a rocker-shaft which is connected with the upper arm of the walking beam, and thus nearly all of the valve motion is placed inside of the main and parallel rods, guide yoke and guides, protecting it in case of accident.

Mr. Whittekin is at present designing an engine for passenger service on the same roads, which will have the same general features as the freight engines except that they will be 10-wheelers with larger diameter of driving wheels, and greater water capacity and fuel space, thus permitting longer runs.

The passenger engines are to make runs of 35 to 40 kilometers without stops at 40 kilometers (25 miles) per hour. The Government designs to have only two types of engines. The freight engines will be known as Class C-4 and the passenger engines as class P-3.

General Specifications.

Gage	3 ft. 0 in
Cylinders	15 x 18 in.
Valve, gear, modified	Walschaert
Boiler, type	Straight
Boiler, diameter	56 in.
Boiler, thickness of sheets	⅝ in.
Boiler, working pressure	220 lbs.
Boiler, fuel	Wood
Boiler, staying	Radial
Fire-box, material	Steel
Fire-box, length	54 5/16 in.
Fire-box, width	50 in.
Fire-box, depth	Front, 50½ in.; back, 48½ in.
Fire-box, thickness of sheets	Sides, ⅜ in.; back, 5/16 in.; crown, ⅜ in.; tube, ½ in.
Fire-box, water space	Front, 3½ in.; sides, 2½ in.; back, 2½ in.
Tubes, material	Iron
Tubes, size	No. 12 W. G.
Tubes, number	170
Tubes, diameter	2 in.
Tubes, length	13 ft. ½ in.
Heating surface, fire-box	72.9 sq. ft.
Heating surface, tubes	1,153.4 sq. ft.
Heating surface, total	1,226.3 sq. ft.
Grate area	18.75 sq. ft.
Driving wheels, diameter outside	34 in.
Driving wheels, diameter of center	28 in.
Driving wheels, journals	7 x 6 in.
Engine truck wheels (front), diameter	24 in.
Engine truck wheels, journals	4 x 6 in.
Wheel base, driving	9 ft. 0 in.
Wheel base, rigid	9 ft. 0 in.
Wheel base, total engine	15 ft. 11 in.
Wheel base, total engine and tender	40 ft. 5½ in.
Weight, on driving wheels	75,630 lbs.
Weight, on truck, front	7,450 lbs.
Weight, total engine	83,080 lbs.
Weight, total engine and tender	113,000 lbs.
Tank capacity	1,500 gals.
Tender wheels, number	8
Tender wheels, diameter	25½ in.
Tender wheels, journals	3¼ x 6 in.
Service	Heavy freight
Brake	American Steam Brake applied to drivers and all tender wheels



Standard Freight Locomotive of the Colombian Government Railroads.

Built by the BALDWIN LOCOMOTIVE WORKS, *Philadelphia.*

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

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The tremendous volcanic outburst in Martinique and St. Vincent would seem not particularly to concern a journal of transportation and engineering, but there is at least one aspect of it which may properly concern us. The island of Martinique is 1,400 miles in a straight line from Colon and 1,650 or 1,700 miles from Graytown. It is not at all impossible or even improbable that we shall hear of unusual volcanic or earthquake disturbances in the regions of the two canals, although so far as accounts have gone this latest occurrence appears to have been strictly volcanic. At any rate, it serves to make people think again of the probability of earthquakes along the lines of the projected Isthmian canals, and to think of the relative liability to earthquakes on the different routes. General Henry L. Abbott has contributed to a New York journal a letter, which was published on Monday, in which he speaks accurately and from the records, concerning this matter. Observations have been made with instruments established near the city of Panama, and with instruments at San José de Costa Rica, near the route of the Nicaragua Canal and about 60 miles from the locks of the Eastern Division. In 1901 there were observed at Panama five earthquake movements; one of these was so slight as to be questionable and only one was appreciable to the population. This occurred on the 5th of last September. At San José 50 earthquake movements were recorded during the year 1901. Twenty-seven of these are classed by the observer as shocks. Seven of them as strong shocks. Two which were noted as slight shocks were yet strong enough to cause people to run into the streets. In nearly every instance these movements reached the place of observation coming from the direction of the canal route. Perhaps some of our readers will remember the discussion of this matter by Mr. Buneau-Varilla, which we published some time ago. Mr. Buneau-Varilla demonstrated with considerable success, as it seemed to us, the proposition that the line of the Nicaragua Canal is much more liable to earthquake disturbances than that of the Panama Canal. In this, however, the Isthmian Canal Commission did not coincide, or, at least, the Commission did not think the difference in liability sufficiently well established to justify them in making that a governing condition. We are not familiar with the facts and arguments which came before the Commission, and therefore do not presume to question the wisdom of their action.

The "Waterbury Watch" Plan in Building Locomotives.

There appeared recently in a daily newspaper a report of some remarks by Sir Alfred Hickman, M. P., formerly President of the British Iron Trade Association, in the matter of American locomotives. In these remarks appeared several statements which have had much currency in the British press, which have been often denied, and which perhaps it may be well enough to again deny.

Sir Alfred said that engines upon which American builders quoted for India and other countries in competition with the British builders, were all "of their stock standards," and again, that they are "composed of stock parts like a Waterbury watch." This queer fable is very popular. The fact is, however, that locomotives built for India, for instance, are built here just as they would be in Great Britain. Every part is made specially for the contract and in accordance with the requirements of the case. That is, they have to conform to the required weight per axle, weight per foot of rigid wheel base, weight per foot of engine and tender, height and width over-all, physical tests of materials, etc. These requirements are laid down by the consulting engineers for the Indian Railways and their inspectors are in the shops as the work progresses.

Sir Alfred Hickman says that the British maker must have all of his material tested where it is made. The tests differ and the builder cannot order his material beforehand, nor can a steel maker make the material beforehand, because he does not know what tests may be required. He says that this delays the building of the engine by 25 to 50 per cent., and he says further that the American builder keeps most of his material ready and partly worked up and does not submit to such tests. The facts are that the American locomotive builder and the American steel maker accept the tests prescribed by the consulting engineers through whom the orders come. So far as we can ascertain the only exception to this rule has been with certain tests for axles, which have appeared to some of our builders to be unsuitable. A guarantee has been demanded and the builders have preferred to base their contracts on the guarantee rather than on the specifications, so far as axles go.

Last February (pages 123 and 130) we published considerable extracts from a report made by a conference of engineers and railroad officers assembled in Calcutta, in December, at which practically all of the Indian railroads were represented. There were also government consulting engineers in attendance. These gentlemen agreed that it is not desirable to relax present specifications and methods of inspection, but that these matters may well be left to those who now have them in charge, namely, the consulting engineers in London. If there are difficulties and delays it is the business of the consulting engineers to send competent inspectors. Concerning American engines these gentlemen agreed that they were well worth the money paid for them; that their design and material were excellent, in some particulars better than the British. They had proved a perfect godsend, at a time when British builders were unable to offer anything better within any reasonable time. The general opinion of the members was that the outcry against American engines had been engineered by newspapers and politicians.

Of course, we do not expect to stop the progress of the "Waterbury watch" story, and "parts kept in stock ready to assemble," and so on, but doubtless a few of our readers will be glad to know the facts.

Standard Loadings for Railroad Bridges.

In our issue of May 2, Mr. Ward Baldwin gave an important table of specified bridge loadings on the principal railroads of North America. Mr. Baldwin says "the only standard loadings that have been at all generally adopted are those proposed by Mr. Theodore Cooper. Very little, if any, progress towards standardization of loadings has been made." But his tables seem to show that there has been a great advance towards a common standard.

In 1894 Mr. Cooper read a paper before the American Society of Civil Engineers proposing a standard system of loadings where the spacings of the several wheels were to be constant for all types and the loads on the pilot and tender wheels were to be proportional to the loads on the drivers. These spacings and proportionate loads, after a full discussion, were modified by Mr. Cooper and incorporated into the 1896 edition of his specifications. We all know how long it takes to establish any standard, and we therefore think that the advance towards a common type of bridge loading, as shown by Mr. Baldwin's tables, is great and is steadily towards the Cooper types.

Many roads have adopted fully the Cooper loadings, and the great majority, as shown by these tables, have approximated so closely as to indicate their general merit. If we take the 41 roads, covering some 80,000 miles, which have adopted standards exactly or approximately Cooper's E. 40 and E. 50 and consider, first the *spacings*, we find for some *twenty-five* typical engines as follows:

Spacing for leading wheel, 18 have 8 ft. (C.); average of all, 7 ft. 10⅜ in.

Driving wheel base, 16 have 15 ft. (C.); average of all, 14 ft. 11 in.

Spacing between engine and tender, 10 have 9 ft. (C.); average of all, 9 ft. 6 in.

Tender wheel base, 13 have 16 ft. (C.); average of all, 15 ft. 9 in.

Space between tender and truck, 18 have 8 ft. (C.); average of all, 8 ft. 5 in.

Space between tender and following train, 11 have 5 ft. (C.); average of all, 4 ft. 3½ in.

Secondly, considering the loads on truck and tender:

Load on truck, 15 have Cooper's; average is 0.977 of Cooper's.

Load on tender, 7 have Cooper's; average is 0.987 of Cooper's.

If the selection of the majority and the average conclusion of all indicate anything, it would appear that the Cooper loadings have come to stay. It looks from the tables as if the common tendency for some to vary just a little from a proposed standard is the only explanation why one adds a few inches at some point and a thousand pounds on some wheel and another takes the same off, especially when in neither case does the type come any nearer the actual engines than the one they partially copy.

The principal bridge companies have adopted and recommend the Cooper loadings. Probably if we could get into the computing rooms of most bridge designing offices we should find that Cooper's loading is actually used for designing all these bridges, and no one could find it out.

The effects of the driving wheels and full engines approximately reach their maximum as follows:

For one wheel, spans of 8 to 10 ft.
For two wheels, spans of 10 to 14 ft.
For three wheels, spans of 14 to 22 ft.
For four wheels, spans of 22 to 30 ft.
For one engine and tender, spans of 70 to 75 ft.
For two engines and tenders, spans of 100 to 120 ft.

As spans of these sizes under the tendency of present practice would be either rolled beams or plate girders, the little refinements between these different types of engines could not be realized without planing or draw-filing the beams and girders. Would any Chief Engineer like to tell his employers that he believed a few more tons of coal and water in the tenders and any moderate change of spacing between the wheels would have an important effect upon the strength of the bridges he was building?

In considering the train loads following the different engines we have been considering, viz., E. 40 and E. 50, we find for the E. 40 Class, 10 have 4,000 lbs., 3 have 4,500 lbs. and 1 has 5,000 lbs.; E. 50 Class, 5 have 4,000 lbs., 2 have 4,500 lbs. and 4 have 5,000 lbs.

Of the 80 types given by Mr. Baldwin, 34 have a following train load of 4,000 lbs.; 16 from 4,000 to 5,000 lbs.; 12, 5,000 lbs. and one (ore-carrying), 6,600 lbs., showing that the train loads and engine loads are each tending to a possible maximum.

In 1899 Mr. Cooper, in his book on American Railroad Bridges, estimated that there were about 2,650 miles of bridges over 20 ft. in the United States, but that only about 47 miles, or less than 2 per cent., of these were spans of over 150 ft.

As stated before, two engines only produce the maximum effects for spans from 100 to 120 ft., which would probably cover 80 to 90 per cent. of all our bridges. The effect of the short additional train load for spans up to 150 ft. as between 4,000 and 5,000 lbs. per foot would not change the weight of the metal in the bridge far from 2 per cent. If then a set of standards already in extensive use can be made to cover 98 per cent. of our bridges as closely as a lot of miscellaneous ones, is not the benefit sufficient to justify the adoption?

In the development of the future, it is probable that the relation between the engine loads and the train loads as given in Cooper's standard will come true, an advancement of the tractive power (driving wheel loads) tending to heavier cars and vice versa; except possibly mountain roads, but such roads are less likely to have bridges of long spans where the train load will be of any effect.

In Massachusetts a bill has been introduced in the Legislature to further define the policy of the State in regard to standard (steam) railroads and street railroads. It provides that "A railroad corporation may, subject to the approval of the Board of Railroad Commissioners, subscribe for, purchase, own, invest in and hold any shares of the capital stock of any street railway company and may vote on all shares of stock so . . . held." If the State is to favor or even permit community of interest between the existing standard railroads and the electric lines which are being built in various localities an Act of this kind would seem to be a necessity, for the

law regulating the issue of new stock by a railroad company is so rigid that even a large and rich corporation cannot very well buy interests in outside properties without much investigation and red tape; and generally not at all, except indirectly. That the question of favoring or forbidding such consolidations may become a pressing one is evident from what has been done in Connecticut. The proviso that purchases must be approved by the railroad commissioners serves, of course, to make the proposed law simply a declaration of general policy; merely a declaration that the State *may*, in some cases, approve such mergers. That some applications would probably be quickly rejected is apparent from the fact that some electric lines, built to take business away from an existing railroad, have given low rates and have convinced the public that competition has been a benefit; while it is no doubt equally true that some electric feeders to the long distance railroads could be made more useful to the public if they were worked by the bigger company.

The wreck of a so-called "air ship" occurred in Paris on Monday of this week. The balloon took fire, or exploded, when about 1,500 ft. above the earth, and two men who were in the car were killed. It would seem reasonable that this incident should make a few people understand one fundamental objection to all plans for navigating the air, which has been often pointed out. If the machinery is disabled or if the balloon bursts the aeroplane or the "air ship" falls to the ground. It is worth while to stop and ask what would have been the state of ocean navigation to-day if it had been developed under such conditions; namely, if any accident to the ship had with almost unfailing certainty sent that ship to the bottom of the ocean. It is astonishing to see how many men otherwise intelligent take seriously the matter of navigating the air.

NEW PUBLICATIONS.

Forced Draft.—Its production by Mechanical Means. By William Wallace Christie, Mem. A. S. M. E. New York: D. Van Nostrand Company, 1901. 50 cents. This little book of 42 pages is a carefully balanced statement of the pros and cons of mechanical vs. natural draft. One feels, in reading it, that the apparent difference between the two, often turns out to be due to the comparison of a good example of one kind with a bad example of the other. There are some specific cases in which mechanical draft shows some decided advantages, but they are very often, though not always, more matters of convenience, comfort and space-economy, than superiority in annual operating cost. Mr. Christie, though he prefers natural draft, states the case fairly, for each side, and the result is that a great deal of very valuable information respecting both systems, has been compressed into very small space, for the use of those who are interested in the subject.

The Early History of the Harlem Railroad.—In the May issue of the *Four-Track News*, appears the text of an address delivered by Mr. George H. Daniels, General Passenger Agent of the New York Central, at the annual banquet of the Transportation Club last month. This is a condensed, but interesting and convenient, story of the development of the Harlem Railroad. It is illustrated by numerous engravings from King's Handbook of New York City.

A Map of Pittsburgh.—Mr. N. P. Hyndman, 7 Wood street, Pittsburgh, Pa., sends a copy of his map of the Pittsburgh coal region, revised to April of this year. The map is 27 in. x 48 in., drawn with great detail. It shows the railroad lines centering in Pittsburgh, and the relative situations of industrial plants and lines of communication. It is sold at $4.

TRADE CATALOGUES.

Refrigeration and Cold Storage.—The H. W. Johns-Manville Company issue a new 24-page pamphlet describing the uses of Keystone Hair Insulator and include a few sectional drawings showing good examples of cold-air box and cold-storage design. More of these designs in future issues of this neat trade catalogue would add to its value.

Steam Hammers.—The Bement, Miles & Co.'s new steam hammer catalogue has just been issued. It contains a number of finely executed half-tones of single frame steam hammers, double frame hammers, open frame hammers, double frame steel tilting hammers and drop hammers, of the ordinary kind and also steam operated. Besides the half-tones, a general description of the various kinds is given, also a few words of explanation about each of the parts. These hammers are all rated according to the actual weight of the falling parts, thus a 1,100 lb. hammer is one whose piston and rod, ram and top die weigh together 1,100 lbs. A couple of line cuts of the foundations required for single and double frame hammers are given, with an explanation of how the anvil piers are made, and the height at which the anvil top must stand, to insure the piston not striking the bottom cylinder head. Various tables of sizes and weights appear, and at the end are some general instructions concerning erecting, starting and maintenance. The company's New York office is at 136 and 138 Liberty street. Catalogues will be supplied to those interested upon application.

Catalogue B of the Stannard & White Co., Appleton, Wis., comprises illustrations, descriptions and prices of locomotive cab seats, of which this company makes a specialty. It manufactures a great variety of these seats to suit all conditions and requirements of service. The line includes deck and half-deck seats; seats and boxes; pool seats which an engineman can fold up and carry with him; combination seats, dust-tight cabinets and boxes, etc. Other products of the company include folding furniture.

Pawling & Harnischfeger, of Milwaukee, Wis., show in their bulletin No. 10, some chain block traveling cranes and standard I-beam trolleys, which are illustrated and briefly described. The sizes of beams are given for weights of trolley.

Crocker-Wheeler Bulletins.—We have received from the Crocker-Wheeler Company, of Ampere, N. J., several of their later bulletins. Among them are bulletin No. 13, dealing with engine-type generators; this bulletin supersedes Nos. 6 and 12. Bulletin No. 14 is on belt type machines, and supersedes 4 and 9. No. 16 is also concerned with belt-type machines, but specifically with bipolar motors, and supersedes 4 and 11. Bulletin No. 17 gives information about motor dynamos and dynamotors for telephone and telegraph plants, and supersedes No. 3. No. 18 is a general description of the electric equipment of the Joseph Dixon Crucible Co.'s works in Jersey City. It is called electric plant of a graphite factory. Bulletin No. 20, dealing with belt-type machines, takes up small multipolar sizes. It supersedes Nos. 4, 10 and 15. The bulletins are well and clearly illustrated by half-tones and line engravings and the letter-press is to the point.

Canadian Pacific Train Rules.

As heretofore noted in these columns, the Canadian Pacific has recently adopted a new code of train rules, based mainly on the standard code of the American Railway Association. These rules have been prepared with great care and good judgment; and as they contain many ideas not found in the codes of the principal roads in "the States" we give in the following paragraphs some extracts, with notes of some of the principal peculiarities. The influence of English ideas is observable in some of the rules.

CANADIAN PACIFIC TRAIN RULES.

The general rules, lettered A, B, C, etc., fill three pages, the rules beyond L covering various subjects commonly found in codes, but usually spread around through different departments. We quote two of these:

"Z. Cars must not be placed on the main track to be loaded or unloaded unless authorized by a train order."

"DD. Employees desirous of appealing to the head of the department must do so through the proper officer."

In the definitions are a number not found in the last published edition of the Standard Code, and some of those which do correspond with the Standard are different in phraseology. The definition of a fixed signal is "A signal of fixed location having two or more indications affecting the movement of a train."

Rule 1-*a* requires employees in charge of clocks to set them, daily, if they vary more than ten seconds from the standard time. Rule 2 names a dozen classes of men who must have approved watches. Certificates must be renewed every January and July. Watches must be inspected and recorded in the first and the third week of every month. A man must not regulate his watch himself, nor must he set it, unless it stops owing to failure to wind.

Rule 3 has three additional paragraphs. Before starting on a trip conductors and engineers must compare, "each seeing the time by the other's watch"; and they must compare with their brakemen and firemen.

In rule 10 green is the color for Proceed, and yellow for "Proceed with caution."

Rule 11 provides for red and yellow fusees. Fusees must not be used on bridges or where they may communicate fire.

There are no illustrations with rule 12. The different paragraphs in rule 14 are not arranged in the same order as in the Standard Code.

Rule 19-*a* requires a green light to the front and a red light to the rear on the cupola of the "van" (in addition to standard tail lights.)

In Rule 20, green flags and lights are prescribed, according to the standard code, to indicate that a second section of the train is following; though in Rules 8 and 10 green means "proceed."

Rule 24 has the proviso "but always over public road crossings at grade."

Rule 26 is followed by 26-*a* and 26-*b* describing fixed signals. Green is the indication for Proceed.

Rule 27-*a* reads "Firemen must look out for fixed signals, for the train signals prescribed by rules 20 and 21, and for the numbers of engines on trains; and on engines on which it is practicable to do so, announce the indication of fixed signals, the color of the train signals, and the numbers of engines on trains, to engineers, who, having seen them, must repeat to firemen their announcement, if it was correct."

Rule 29 is omitted, but the subject is covered in 31-*b*; and this rule requires signal 14-*m* (which in the Standard Code is 14-*k*) to be given to trains of superior class affected by the signals.

Rule 33 provides for the use of green signals at public road crossings for giving signals to wayfarers.

Rules 83-*a b c* require examination of bulletins, entry of trains on registers before every trip, and at other times; and, unless otherwise directed a train must not start without a Terminal Clearance.

Rules 88 and 89 apply only to meeting points other than those fixed by train order; for meeting points fixed by order rule 89-*a* is provided.

Rule 90-*b* requires that an inferior train shall keep at least ten minutes off the time of a superior train in the same direction.

Rule 91 provides for a time interval of ten minutes, "unless the right to proceed is given by block signal"; and if the train ahead is a passenger or mixed train it must not be followed within 20 minutes. In other words, the block system is in use pretty generally; but a time interval—10 to 20 minutes—is prescribed for regular use. This apparently is to provide for cases where an agent is off duty and stations are far apart.

Rule 98-*a* requires all but first-class trains to enter yards under control; 98-*b* gives further directions in this line; 98-*c* requires stops at draw-bridges not interlocked; 98-*d* limits the speed of passenger trains over draw-bridges and railroad crossings to 12 miles an hour; and freight trains to 8. Rule 98-*e* requires the conductor, except on passenger trains, to give the Proceed signal one mile before reaching a station at which the train is not required to stop. If the signal is not given the engineman must stop. Rules 98 (f) to 98 (l) contain further directions about handling trains.

Rule 99 has six paragraphs. In the third line this rule reads "if it is not otherwise sufficiently protected." The distance which a flagman must go back is specified (a) for day time, on level or ascending grades where there is a clear view to the rear; (b) at other times and places; and (c) where there is a down grade toward the train within one mile of its rear. Rule 100 is followed by seven others regarding protection by flag.

Rule 101 requires that if a train on which air-brakes are in use (on any part of it) should break in two, the engineman, on feeling the brakes apply, must immediately shut off steam and place the brake-valve handle in lap position.

The rules for the movement of trains by train orders fill nine pages, and the forms of orders and of blanks fill 19 pages. Rule 201 (a) reads: "The different forms of train orders may be combined in one order, provided there is no movement in such a combination order which does not directly affect the train first named in the order."

Train orders are addressed to the trains (not to C. & E.), and if there is more than one engineman each must have a copy. Orders and records at the despatcher's office must be written in ink, and ink is also required to be used in the receipt which an operator signs for orders on hand when he goes on duty. When conductors and enginemen change off and transfer orders, written receipts must be given; and, after the change, conductors and enginemen must compare their orders. In the body of an order the number of the engine of a train must be given; if it is unknown the word "unknown" must be used. Extra trains are designated as up and down, "up" meaning west or north, and "down" meaning east or south. In designating a "double header" train by engine number the number to be used will be that of the foremost of the two or more engines which are to go through with the train; thus, if a train has two engines throughout its trip, and a helper in front a part of the way, the number to be used, while there are three engines, will be that of the middle engine. Time and numbers, except numbers of regular trains and of engines and of the day of the month when the day of the week is given, must be given in words followed by the figures.

Conductors receiving orders must read them aloud to the operator and the engineman must read his to the conductor, after which the conductor's copy must be signed by the engineman. When a train has two engines but no conductor, the runner of the leading engine must deal with orders as is required of the conductor.

The "19" form of train order must not be used to restrict the superiority of a train. Enginemen must read their train orders to their firemen, and conductors to their rear brakemen. When a meeting order is unavoidably sent to the meeting point the order must contain the words "This order to . . . at the meeting point." The train order signal stands normally in the all-clear position. While it is in the "stop" position a train for which there are no orders can be allowed to pass, but only on a train order, form J-*b*; having got such an order the operator may hold his signal (not fasten it) at "proceed" long enough to allow the train to pass. A train once stopped at a train order office must not proceed without a clearance card. Operators must report both the arrival and the departure time of all trains.

Besides the usual forms of orders the book gives form D-*a* "Line clear to—for—"; form J-*a* specifying the speed of a train, and J-*b* directing an operator to clear his signal for a train.

Form A is followed by a note requiring meeting orders to be sent to the operator at the meeting point, to be copied on form 19.

Advantages of the Standard Box Car.*

Probably the operating department will be satisfied with any standard, as there is a great advantage in avoiding switching and hauling empty cars to furnish those to fit loads requiring special cars. I have known a car to be switched and hauled 10 miles to be substituted for a car then on the track, on account of this latter car having a few letters on the side, although both cars were built on the same dimensions and owned by the same railroad, and the frieght would have injured neither, but the one on the track was marked for special business and had to be hauled empty that 10 miles back. Thus the engine hauled the empty car 20 miles on account of the now happily exploded idea that cars must be designated for this or that business.

The traffic department, when all cars conform to the present standard, will make rates and classifications accordingly, and the freight agent will cease to be annoyed by the shipper objecting to the size of the car furnished. Now one is too large on account of minimum, for the small car is the basis on which he wishes to make shipment. Another objects to a small car as he cannot load the minimum. The railroads never can know how much the extra switching costs, on account of the different sizes of cars required by shippers. May the day soon come, that the grumbling shipper who calls over the 'phone can be told "all cars are alike these days; take the first you can get; there is no choice."

The suggested inside standard of 36 ft. long, 8 ft. 6 in. wide and 8 ft. high, if not based on the report of your committee made some time ago, was probably accepted on the same facts as presented to your committee: that the 50-gallon cask is the package that should have the first consideration in construction of cars. These dimensions will also take two lengths of 18 ft. lumber, 200 barrels of flour or 250 barrels of apples. They will take from 1,800 to 2,000 bushels of oats. When once the whole equipment is composed of cars of these dimensions, the business of the country, even in bulky articles, will soon adapt itself to them and every one will be satisfied, as there will be no others which a shipper can obtain and get the best of his competitor.

Another matter should be called to attention. Employees who tramp the yards day and night, and particularly those with lanterns, should be considered, and the numbers placed for their convenience, rather than for that of the painters. The numbers and initials should be placed close together, and always at the same locality on the car, no matter how much the car is lettered. The particular initials that always accompany the numbers to designate the road should be placed in as close connection with that number on the side of the car as possible, and never over one-third the height from the sills to the eaves.

TECHNICAL.

Manufacturing and Business.

F. M. Hicks, Chicago, has moved from 225 Dearborn street into much larger offices in the Fisher Building, 277 Dearborn street.

Hugh Mann, part owner of the Canadian Northern, on May 9 stated that he was on his way to Chicago to buy supplies for additional building.

The East Carolina R. R. is in the market for 200 tons of new or relaying 45-lb. rail, and has for sale about 250 tons of 30-lb. relaying rail in good condition.

The Trojan Car Coupler Co. has filed with the Secretary of State, New York, a certificate saying that it has reduced its capital stock from $300,000 to $60,000.

The general offices of the Commonwealth Steel Co., of St. Louis, Mo., have been moved from 415 Locust street to permanent quarters in the New Bank of Commerce Building.

The Stannard & White Co., Appleton, Wis., makers of locomotive cab seats and cushions, recently suffered a loss by fire, the plant being completely destroyed. The firm is readjusting matters and endeavoring to get into shape to resume business in a short time.

The Chicago Pneumatic Tool Co. has been awarded contracts for three of its large "Franklin" air compressors for the Philadelphia & Reading Ry.; two compound air compressors of 2,000 cu. ft. capacity for the new car shops of the New York, New Haven & Hartford at Readville, Mass., and one for the Atchison, Topeka & Santa Fe.

The Canadian Rolling Stock Co. has been incorporated in Canada, with $2,000,000 capital, to make cars, locomotives and railroad supplies. The first board of directors is: Theo. S. Leach and E. V. Douglas, of Philadelphia, Pa.; Francis H. Clergue, Bertram J. Clergue and Henry C. Hamilton, of Sault Ste Marie, Ont. The principal office will be in Toronto.

The Alabama Frog & Switch Co. has been organized, with a preliminary capital stock of $10,000. The first board of officers is: President, Morton K. Moore, of Birmingham; Secretary and Treasurer, M. B. Wellborn, Anniston; General Manager, T. E. Kilby, of Anniston. The company will build a plant at Eleventh and Mulberry streets, Anniston, to make machinery for making frogs and switches. It is said the contract will be let at once.

*Extract from a paper by Mr. H. H. Perkins, Agent of the New York Central & Hudson River, read before the Central Railway Club at Buffalo, May 9.

Iron and Steel.

The Sterling Steel Foundry Co., of Pittsburgh, has recently been incorporated.

The West Penn Construction Co., of Pittsburgh, has recently been incorporated.

It is said a contract for about 6,000 tons of rails has been placed with Belgian mills for shipment to Alaska.

The shareholders of the Dominion Iron & Steel Co. have authorized an increase of capital stock of $5,000,000.

The Northwest Department of the Cambria Steel Co. at Johnstown has been sold to the Barret Manufacturing Co. of Philadelphia.

A contract for a steel stack over 300 ft. high for a power plant at Mapimi, Mexico, has been given to the Riter-Conley Mfg. Co., of Pittsburgh.

The new shops of the Rochester Railway Co., Rochester, N. Y., were opened on May 5. All repair work on this road will be carried on at this place.

President Rushton, of the Tidewater Steel Co., in his annual report, says that the $600,000 obtained from the sale of preferred stock will be used for building additional furnaces and improvements.

It is announced that the new addition to the works of the Lukens Iron & Steel Co. will be finished in about two months, increasing the capacity by 80,000 tons of steel, bringing the annual capacity up to about 200,000 tons.

The Walsh & Weidner Bridge Co. of Hamilton County, Tenn., has been incorporated with $150,000 capital. The office is in Nashville. The incorporators are: Michael G. Weidner, Morgan Llewellyn, Albert H. Chapman, Frank Jenkins and George D. Lancaster.

The American Pipe & Foundry Co. has been incorporated in Alabama, with $100,000 capital. W. J. Long, T. Y. Huffman and H. C. Mead are the incorporators. The principal office will be in Bessemer, Ala. The company proposes to make and sell iron pipe, car wheels and switches.

The Sharon Steel Co. broke all its previous records in production in its open-hearth department last month. This department turned out in April 18,806 tons. There are eight furnaces in the department and not all were active all of the time, some undergoing repairs. To make this steel there were 354 heats. The best daily record during the month was 971 tons in 24 hours.

Benn Conger, of Groton, N. Y., writes us that it is a fact that the old plant of the Groton Bridge Co. has been bought back from the American Bridge Co., and the new Groton Bridge Co. has been formed and expects to have the works in operation pretty soon. There are plenty of workmen in and about Groton who have been engaged in the bridge business for the past 25 years, and he says that with the present amount of business in sight, it is safe to presume that the new company will have a business soon well established.

International Pneumatic Tool Co.

Rumors of the sale of this company have been frequent lately. Concerning these rumors we have just received the following letter from Mr. Charles Hansel, Vice-President and General Manager of the Pneumatic Signal Co.: "I have noticed several items in the daily papers concerning the sale of the International Pneumatic Tool Co. to the Chicago Pneumatic Tool Co. I am authorized to say that no sale has been effected and I am requested by Mr. O'Donnell, the Managing Director of the International Pneumatic Tool Co., to deny all rumors to that effect."

American Bridge Company Improvements.

It is given out officially that the American Bridge Co. will concentrate its plants in the Pittsburgh District at Economy, on the Fort Wayne R. R., where some two years ago the Berlin Bridge Co. began work on a new shop. The Keystone and Shiffler plants at West Homestead are to be dismantled to permit of extensions to the Homestead plant. The plant of the Pittsburgh Bridge Co. and the Schultz Bridge Co., the former at Pittsburgh and the latter at McKees Rocks, are also to be dismantled.

The western plants of the company are also to be centralized and a new plant built on the lake front near Chicago, with an annual capacity of about 100,000 tons. The Lassig and American plants at Chicago, and the Lafayette, Ind., and Milwaukee plants are to be dismantled when the new Chicago plant is finished. The Chicago plant, while being smaller than the new plant at Economy, will be almost a duplicate in arrangement of its departments. The Chicago plant will cost about $3,000,000. Land for the Chicago plant is already bought. The Toledo Bridge Works, which is comparatively a new plant and which has an annual capacity of 25,000 tons, will not be dismantled, as currently reported. James Christie, Chief Engineer of the American Bridge Co., will have charge of erection and will be assisted by Richard Khuen, Assistant Engineer, Pittsburgh District.

Safety Car Heating Changes.

At the annual meeting of the Safety Car Heating & Lighting Co. the retiring board of directors was re-elected with the exception of S. M. Dodd, W. H. Kimball and E. J. Berwind, who are succeeded by S. R. Callaway, R. M. Dixon and Randolph Parmly. The Atchison, Topeka & Santa Fe has ordered Pintsch lighting equipment for 27 more cars. This makes 120 cars which they have ordered equipped with the Pintsch light since the latter part of December. The number of cars on the Atchison road now equipped with the Pintsch system aggregates 194.

Philadelphia Pneumatic Tool Co.

The new shops of the Philadelphia Pneumatic Tool Co. at Twenty-first street and Allegheny avenue, Philadelphia, are about finished and the company expects to move from its present location the last part of this month. The power plant is installed and everything will be in readiness for full operation in the course of two weeks. About $10,000 worth of new machine tools will be delivered at the new works early in June, and with these the company will soon be able to relieve the much overcrowded condition of its present works and make more prompt deliveries than heretofore. About 95 men are employed in the present works and the number will be increased to 150 in the new. The company has recently placed on the market two new sizes of rotary drills, and has perfected a new and improved riveting hammer which is being made in three sizes having capacities varying from ¼ to 1¼-in. rivets. Orders aggregating nearly 200 tools have recently been received by the company from one of the largest ship yards in the country. The company is preparing for an elaborate display of its tools in a working exhibit at the conventions of Master Mechanics' and Master Car Builders' Associations.

Standard Steel Car Company.

The Standard Steel Car Co., which is now building a large plant to make steel cars at Butler, Pa., has opened an office in the Maiden Lane Building, Broadway, New York City, which will be the eastern sales department of the company. James B. Brady, until May 1 General Sales Agent of the Pressed Steel Car Co., has been made General Sales Agent of the Standard Co. R. L. Gordon, formerly with the Pressed Steel Car Co., has also taken service with the Standard Co. He will probably be placed in New York.

Preserving Cross Ties.

The Chicago Tie Preservation Co. (Octave Chanute, President), has a works at Mount Vernon, Ill. There the company has begun the treatment of ties by the zinc-creosote process. So far as we know the work going on at present is experimental, not commercial. Doubtless the reader is familiar with Mr. Chanute's various reports of his investigations and experiments, and sooner or later the country will be enriched by his zeal in following up this important subject.

New Isthmian Canal Bill.

On May 7 Senator Hoar introduced in the U. S. Senate a brief new bill providing for an Isthmian Canal and reading as follows: "It shall be the duty of the President of the United States, as soon as the same can economically and conveniently be done, to cause to be excavated and constructed a canal of such depth and capacity as will be sufficient for the movement of ships of the greatest tonnage and draft now in use, and such as may be required for any changes in such tonnage or draft as may be reasonably anticipated, from the Atlantic to the Pacific, by such route as may be selected by him, having satisfied himself of the right of the United States to construct and protect such canal." The President is also directed by the bill to have harbors built at both ends of the canal, and he is given authority "to employ such agencies and obtain such advice as he shall find necessary." Authority is also given the President to determine the terms upon which foreign countries may use the canal. The aggregate cost of the canal is fixed at $180,000,000, and $10,000,000 is appropriated for beginning the work.

Railway Steel Spring Co. and the Steel-Tired Wheel Co.

Notice is given of a stockholders' meeting, to be held at the office of the company, 15 Exchange place, Jersey City, N. J., on June 3 to take action upon the agreement for the merger of the Steel-Tired Wheel Co. into the Railway Steel Spring Co. The proposed agreement provides for the increase of the capital stock of the Railway Steel Spring Co. from $20,000,000 to $27,000,000, the additional capital being divided into 35,000 shares of preferred stock and 35,000 shares of common. This will be used to acquire all the assets of the Steel-Tired Wheel Co., which owns plants to make steel-tired wheels at Hudson and Depew, N. Y.; Scranton, Pa.; Pullman, Ill.; Denver, Col.; Chicago, Ill., and Cleveland, Ohio.

Crescent Ship Yards Company.

Articles of incorporation were filed in the County Clerk's Office at Elizabeth, N. J., on May 12, by the Crescent Ship Yards Co., which has an authorized capital of $1,200,000. The principal stockholders are Lewis Nixon, Marvin S. Chase and P. H. Gilhooley. The company has for the past eight years leased the shipyards of Samuel L. Moore & Sons Co. The incorporation is practically a continuation of the old concern.

Jones & Laughlins to Incorporate in Pennsylvania.

As a result of the passing of more liberal corporation laws in Pennsylvania, the old concern known as Jones & Laughlins, Ltd., has given notice that it will re-incorporate on June 2 as the Jones & Laughlin Steel Co., of Pittsburgh. The present concern is capitalized at $20,000,000; the new company will have $50,000,000 capital.

Stevenson Viaduct, New Haven Road.

Contract has recently been let by the New York, New Haven & Hartford to Foley & Coughlin, of Roxbury, Mass., to build a long stone culvert over a brook in the deep ravine near Stevenson Station, on the Berkshire Di-

vision. This ravine is at present crossed by a high viaduct nearly 1,000 ft. long, and as soon as the culvert is finished the viaduct will be filled in, the filling being done from the present roadway, using about 75,000 cu. yds. of earth.

United States Steel Improvements.

In a speech made to the workmen at the Duquesne Works, President Schwab, of the United States Steel Corporation, on May 8, said that the United States Steel Corporation will spend $60,000,000 in making improvements on present holdings and instead of building one large tube mill in the vicinity of Pittsburgh three will be erected. The greater part of the money will be spent on the works of the company in and around Pittsburgh and much of it will be spent in building new plants. Nearly 20 new plants will be built. The works of the National Tube Company will not be moved, but will be fully repaired.

The sites for the new works have not been decided upon, but will be, on the present inspection trip of Mr. Schwab and others, as will also the amount of money needed for repairs in each of the works now owned by the company. It has been decided definitely to build three additional tube mills in the vicinity of Pittsburgh. They will be larger and of a greater capacity in every respect than the plant at McKeesport.

THE SCRAP HEAP.

Notes.

It is announced that the Southern Pacific will take into its own hands the management of all of the eating houses at the stations on its lines.

The Delaware, Lackawanna & Western has discontinued the practice of assigning a conductor to pushing engines when running without trains, and will hereafter send with such engines only an engineman, a fireman and a flagman.

On Thursday, May 8, an eastbound passenger train of the Pennsylvania road, consisting of engine 1,968 and six cars, was run from Harrisburg, Pa., to Morrisville, N. Y., 126 miles, in 125 minutes. The train, the St. Louis express, left Harrisburg at 4:37 and arrived at Morrisville at 6:42.

The Appellate Division of the Supreme Court of New York has sustained the Union Traction Co., of Albany, in its refusal to carry the policemen and firemen of that city free. The court holds that these men are public officials, and therefore are forbidden by the Constitution to ride free. President Vreeland, of the Metropolitan Street Railway of New York City, tells a reporter that he regrets this decision; policemen and firemen are an advantage on a street car as they help to protect the passengers. The presence of policemen discourages pickpockets, and policemen in plain clothes have arrested many pickpockets on the company's cars.

The Atchison, Topeka & Santa Fe has just placed in service about 40 new passenger engines that take 12-car trains over 1½ per cent. grades with ease, and make schedule time. These engines, with which our readers are already familiar, weigh about 209,000 lbs. each. A special, consisting of 13 Pullman cars, was recently taken from Chicago to Kansas City by one of these engines at an average speed exceeding 33 miles per hour. This included all stops and delays from any cause for a run of 458 miles accomplished in 13 hours and 39 minutes. The weight of the train was approximately 630 tons. No attempt was made to establish a record.

Montreal papers announce that the trackmen of the Eastern Division of the Canadian Pacific are to have their pay raised 20 per cent. This being the decision of a board of arbitration, consisting of Chancellor Boyd, Mr. J. T. Wilson, representing the men, and Mr. Fred. P. Gutellius, C.E., representing the railroad company. It is said that the new rates are $1.25, $1.30 and $1.35 a day. The arbitrator selected by the employees is said to have estimated the increase in the cost of living since 1897 at 25 per cent., while the representative of the railroad company placed it at 18 per cent. It is also announced that the Canadian Pacific has increased the pay of machinists in its shops east of Fort William. About 500 men will have their pay advanced, at varying rates, averaging 10 per cent. From Toronto it is reported that the Grand Trunk has increased the pay of several hundred track men from $1.10 a day to $1.20; and has increased the pay of track foremen from $1.50 and $1.60 a day to $45 a month.

Traffic Notes.

A Chicago paper says that a glucose factory of the Corn Products Co., at Waukegan, Ill., has been closed because the railroads have discontinued the tariffs by which Waukegan enjoyed the same rates as Chicago.

According to Chicago papers, the recent action of the railroads of that city in changing the rates for switching freight cars includes some revisions of the demurrage rules, and the general managers have resolved to make a charge of six cents per ton per day on freight stored in warehouses.

The Railroad Commissioners of Illinois will give a hearing at Springfield, June 3, on the question of revising their maximum tariffs for the transportation of freight on the railroads in the State. It has been represented to the Board that rates from Indiana and Iowa into Illinois are much lower for longer distances than for a much shorter distance in Illinois and are, therefore, a discrimination against the manufacturer and jobbers in the latter State.

The Chicago, Milwaukee & St. Paul is said to have announced at Minneapolis that flour will be taken to the Atlantic Seaboard at the same rates as wheat. The Missouri Pacific has announced a reduction of one cent, Kansas City to the Mississippi River, in the rate on grain destined to eastern points. It is understood that this reduction, which will no doubt be followed by similar reductions by the other routes, will lead to the withdrawal of the complaint which has been made by Kansas City shippers to the Interstate Commerce Commission.

The stenographer of the Atchison, Topeka & Santa Fe, who has been around among the farmers in Oklahoma, and other places, writing letters for them to their friends in the East, telling about their success in farming, about the health of their children, and, incidentally, about the joys of living near the line of the Atchison road, has enlarged his field; and is exercising his wiles in the San Joaquin Valley of California. Moreover, he has amplified his artistic equipment, and now not only writes letters, on letter-heads which will astonish farmers by their glorious beauty, but also carries along a camera, so that his letters can be accompanied by photographs.

The Interstate Commerce Commission in an opinion by Chairman Knapp, has announced its decision in the case of the Red Cloud Mining Company against the Southern Pacific. The point decided is as follows: A tariff fixing a rate on machinery from Erie, Pa., to Salton, Cal., having been legally established, it was the duty of the defendant to apply the rate so published and in effect upon a shipment made by complainant between those points; and if, as claimed by complainant, a contract was made with defendant for a lower charge upon that shipment, such contract was not binding and its violation furnishes no ground for redress under the act to regulate commerce. The complaint in this case was therefore dismissed.

Disastrous Derailment in France.

According to a press despatch of May 6, a train loaded with Belgian pilgrims, most of them sick or lame, on their way to Lourdes, was thrown from the track between Amiens and Compiègne, France, on that day, while the train was going at full speed, killing nine persons. Many were injured.

Disaster to a Military Train in the Transvaal.

Lord Kitchener reported on May 7 an accident to a train bound from Pretoria to Pietersburg, northern Transvaal. The cars were thrown from the track, at a curve, and an officer and 10 men were killed.

The Demand for Structural Steel.

The booking of a large tonnage of structural shapes and plates for delivery next year is the new feature of the iron market in the week [May 8]. For several months most structural mills have been sold up for 1902 and it is now evident that deliveries originally contracted to be made this year will be carried over to 1903. The business closed by Pittsburgh mills the past week for next years is estimated at 50,000 tons. Week by week, with eight months of the year ahead, the character of the iron trade in 1903 is being determined. The situation in plate mills is not entirely clear. From being able two months ago to make fairly prompt deliveries, they are now reported in a number of instances to be sold up for the year. It would seem that the brunt of the steel shortage is to fall on the plate trade, and that after the large producers have filled their engagements in shapes and open-hearth bars they will not have steel sufficient to run their plate mills full. A meeting of plate manufacturers will be held in New York next week, but it is believed the 1.60ct. basis will be reaffirmed, in spite of the sales at $2.00 to $4.00 a ton higher from Eastern mills. The sales of both shapes and plates for 1903 have been on the basis of present pool prices. Sheets are the one line of finished material in which the mills are not sold for months ahead. The steel scarcity promises to continue for months. Imports, while increasing, are only a small factor and to a considerable extent enter into drawback export material. Some sales of German steel are reported in the Chicago district below the prevailing Pittsburgh basis. It is understood that under a through rate from Antwerp to Chicago via New Orleans, of $3.75, billets have been sold at $31.50 Chicago.—*Iron Trade Review.*

Washington Union Station Bill.

The Commissioners of the District of Columbia have urgently recommended an amendment to the union station bill now before the U. S. Senate which will permit other railroads which may be authorized by Congress to enter the District in the future to use the union station and terminals. Last week Senator McMillan, Chairman of the Senate Committee on the District of Columbia, gave notice of an amendment which he will propose to the bill providing for a union station. The amendment provides: "That any railroad company now or hereafter lawfully existing and authorized to extend a line of railroad, and having in fact extended such line, or secured the right by agreement to operate over the lines of any other then-existing railroad, to a point of connection with the tracks of said terminal company, shall have the right to the joint use of said station and terminal upon terms substantially as favorable as those which may then be accorded to any other railroad company using the said station and terminal; and if the parties be unable to agree upon such terms, then the same shall be prescribed by the Supreme Court of the District of Columbia." This is substantially the same as the Patterson amendment previously mentioned. (May 2, p. 332.)

Train Robbery in Arkansas.

Passenger train No. 206, of the St. Louis & San Francisco, was stopped by four masked men near Jonesboro, Ark., on the morning of May 10, about 2 o'clock, and the express car was wrecked by dynamite. It is said that the robbers failed to open the safe, and got no booty. When they flagged the train they thought it was not going to stop soon enough, so they threw a switch under the car next to the last, and these two cars were derailed. The mail and baggage cars were run forward some distance before the dynamite was applied. After giving up the attempt to get the money, the robbers took the engine and ran still farther ahead, finally jumping off and leaving the engine to run wild. It stopped before doing any damage.

Disastrous Explosion of a Car of Naphtha near Pittsburgh.

On the afternoon of May 12 a slight collision which occurred while a freight train was being made up in the yard of the Pittsburgh, Cincinnati, Chicago & St. Louis, at Sheridan, Pa., set fire to a tank car loaded with oil, and the oil which escaped from a leak made in the tank spread fire over a large area around the damaged cars. It is supposed that the oil took fire from a switch light which was broken when the collision occurred. The trainmen who tried to extinguish the fire were unable to do so, and had to run for their lives before the car exploded. A large crowd had gathered to the scene and when the explosion was seen to be imminent the people ran to the sides of the hills on either side of the track. About half an hour after the oil explosion a car of naphtha exploded with terrific force, the gas having been heated by the fire, and a rain of fire fell on the hundreds of people standing on the hill-side. Scores of these people were at once enveloped in flames, and 25 of them were killed, or died soon after. Over 150 were injured. The men on the ground near the cars were all burned to death. The burning oil flowed down the valley into the Ohio River and at the village of Esplen it set fire to natural gas, leaking from a pipe, and the explosion of the gas, which at once followed, wrecked a dozen buildings. A number of men were injured by this second explosion.

LOCOMOTIVE BUILDING.

The Southern Missouri & Arkansas has ordered three engines from the Baldwin Works.

The Pennsylvania is having 30 locomotives built at the Pittsburgh Works of the American Locomotive Co.

The El Oro Mining & Railway Co. has ordered a locomotive from the Dickson Works of the American Locomotive Co.

The Minnesota Land & Construction Co. is having six engines built at the Schenectady Works of the American Locomotive Co.

The Philadelphia & Reading is having 10 locomotives built at the Baldwin Works, in addition to the order reported in our issue of March 28.

The Denver & Rio Grande order with the Baldwin Works for 30 locomotives, reported in our issue of May 2, includes the following specifications: Type, compound consolidation; total weight, 192,000 lbs.; weight on drivers, 170,000 lbs.; cylinders, 17 and 28 x 28; drivers, 54 in.; boiler, straight, with a working steam pressure of 200 lbs.; 344 tubes of charcoal iron 14 ft. 6 in. x 2 in.; fire-box, 102 in. long, 66 in. wide; tank capacity for water, 6,000 gal.; coal capacity, 10 tons. The special equipment includes Westinghouse air-brakes, Marden brake-beams, Diamond "S" brake-shoes, Janney couplers, Nathan monitor injectors, 1897 model; United States metallic valve and piston rod packings; Leach sanding devices, Nathan sight feed lubricators, Ashcroft steam gages, Standard tires and cast steel wheel centers.

The Canadian Pacific order for locomotives, reported in our issue of May 9, is as follows: Twenty ordered from the American Locomotive Co. and four from the Rogers Works. The 20 from the American Locomotive Co. are for October and November, 1902, delivery, compound, 10-wheel, with total weight 161,000 lbs.; weight on drivers, 122,000 lbs.; cylinders, 22 and 35 x 26 in.; drivers, 62 in.; boiler, radial stayed, with working steam pressure of 210 lbs.; 312 tubes of charcoal iron, 14 ft. x 2 in.; fire-box of special quality fire-box steel 108 in. long and 41 in. wide; tank capacity for water, 5,000 gal.; coal capacity, 10 tons. The special equipment includes Westinghouse air-brakes, steel axles, Sterlingworth brake-beams, Tower couplers; Dressel headlights, Craven & Gresham injectors, Sullivan piston rod and valve packing, Star safety valves, Leach sanding devices, Michigan sight feed lubricators and Crosby steam gages.

CAR BUILDING.

The Washington Coal & Coke Co. is having five freights built at the Barney & Smith Works.

The American Car & Foundry Co. has orders for 288 cars of different types for various parties.

The Manistique & Northwestern is having 75 freights built at the Russell Wheel & Foundry Co., Detroit.

The El Paso & Southwestern is having 10 freights built at the Allegheny Works of the Pressed Steel Car Co.

The Chesapeake & Ohio is having 1,000 freight cars built at the Pressed Steel Works, McKees Rocks, Pa.

The Lake Erie, Alliance & Wheeling has ordered 50 gondola cars from the American Car & Foundry Co.

The Cincinnati, New Orleans & Texas Pacific has ordered 1,100 cars from the American Car & Foundry Co.

The Minneapolis, St. Paul & Sault Ste. Marie has ordered 50 refrigerator cars from the American Car & Foundry Co.

The Duluth & Northern Minnesota has purchased from F. M. Hicks 20 flat cars rebuilt by the Hicks Locomotive & Car Works.

The Lackawanna Iron & Steel Co. has ordered from F. M. Hicks 50 flat cars to be rebuilt by the Hicks Locomotive & Car Works.

The East Jordan & Southern has ordered from F. M. Hicks one passenger coach to be rebuilt at the Hicks Locomotive & Car Works.

The Missouri Pacific has ordered 15 baggage, 10 combination baggage and mail, and five postal cars from the American Car & Foundry Co.

The Monongahela Connecting, according to press reports, has ordered 100 cars of 200,000 lbs. capacity from the American Car & Foundry Co.

F. M. Hicks has recently taken orders for rebuilt flat cars from the Inter-Urban Ry., Des Moines, Iowa; Pittsburgh Forge & Iron Co.; Chicot Lumber Co., and Buffalo Iron Co.

The Cleveland, Cincinnati, Chicago & St. Louis is having 11 coaches built at the Barney & Smith Works, and 500 freights at the Berwick Works of the American Car & Foundry Co.

The Mexican Central order with the Mt. Vernon Car Mfg. Co. for 50 flat cars, reported in our issue of April 18, calls for wooden cars of 60,000 lbs. capacity, weight 25,100 lbs., 34 ft. long, over end sills, 8 ft. 10 in. wide over side sills, and 50¼ in. high from top of rail to top of floor. The specifications include wooden underframes, pressed steel bolsters, National Hollow brake-beams, Westinghouse air-brakes, Soule dust guards, Sherwin-Williams paint, Scott springs, Mexican Central trucks and Griffin wheels.

BRIDGE BUILDING.

ALBANY, N. Y.—Bids are wanted by the Superintendent of Public Works until noon of May 26 for building a dam on the Black River at Forestport Oneida County: also for raising and building High Dam on Oswego River, Oswego County, and for building a steel bulkhead at the west end of Battle Island or Braddock's Dam on Oswego River.

ALLENTOWN, PA.—It is quite probable that the new bridge over the Lehigh River will soon be built. The Dauphin County Court has confirmed the report and it is now submitted to the State Board of Buildings and Grounds. The bridge proper will be 756 ft. long, with approaches, 1,059 ft. The estimated cost is $225,000.

AUBURN, PA.—The Schuylkill County Commissioners have taken steps to have a new bridge built over the Schuylkill, south of this town.

BUFFALO, N. Y.—Walter G. Berg, Chief Engineer of the Lehigh Valley, will receive bids until May 17 for a through plate girder double-track bridge over Babcock street in Buffalo.

CASS LAKE, MINN.—The county proposes to issue about $30,000 of bonds for a bridge. Chas. E. Griffith, County Auditor at Walker, can give information.

CEDARTOWN, GA.—Bids are wanted May 19 for two bridges. D. M. Russell, Chairman.

CHICAGO, ILL.—The Trustees of the Sanitary District of Chicago have instructed the Chief Engineer to make surveys and prepare plans for bascule bridges for all points on the South Branch of the Chicago River not already provided for. The order provides for new bridges at Lake, Washington, Madison, Adams, Jackson, Polk, Twelfth, Eighteenth, Twenty-second, Halsted and Loomis streets. The estimated cost is $2,500,000, and it will require three years or more to complete the work.

COLUMBUS, OHIO.—Bids are wanted by the County Auditor until noon of May 19 for the substructure of five bridges. L. E. Jones, County Auditor.

DAYTON, OHIO.—The Board of Public Affairs will probably want bids in about a month for the bridges over the Miami on North Main and West Third streets.

FARGO, N. DAK.—The County Auditor will receive bids until June 3 for some bridge work.

FREMONT, OHIO.—The County Commissioners have decided to build a bridge over the Sandusky River in Fremont. It will probably be located on South Bridge street.

GEORGIA.—The U. S. Senate on May 5 passed the bill authorizing a bridge across the Savannah River from Aiken County, S. C., to Richmond County, Ga.

GREAT FALLS, MONT.—We are told that it is possible that a subway will be built at First Avenue, North, under the Great Northern tracks, next year. Plans are not yet made.

HAMBURG, ONT.—The Hamburg County Road and Bridge Committee has decided to build a steel bridge in place of the Hartman bridge.

HARRIMAN, TENN.—A bill has been introduced in Congress authorizing the Harriman Southern Ry. to build a bridge over the Tennessee River near the mouth of Caney Creek.

HERNDON, PA.—J. D. Bogar, of this city, is said to be interested in a company that will build a steel bridge over the Susquehanna.

INDIANAPOLIS, IND.—The County Commissioners have let a contract to Wm. Fife & Sons for building a stone bridge over White River at Washington street, on condition that the County Council make an additional appropriation of $65,000 to meet the amount of the bid, which was $215,000.

KOKOMO, IND.—The Howe County Commissioners have authorized an expenditure of $54,000 for three bridges in Kokomo and one in Union Township.

LEWISBURG, PA.—It is said that bids are wanted for a steel bridge over the river between Union County and Lewisburg Borough, contractors to furnish plans.

LEXINGTON, KY.—We are told that it is proposed to build a 105-ft. highway bridge over the Cincinnati Southern tracks between Lexington and Georgetown for a turnpike change, and for the Georgetown & Lexington Traction Co. It is possible that the electric railroad company will soon ask bids.

LIMA, OHIO.—It is said a new bridge will be built over Hog Creek on West street.

LITTLE FALLS, MINN.—The U. S. Senate on May 9 passed a bill authorizing the city of Little Falls, Minn., to build a wagon and foot bridge across the Mississippi River within the limits of the city, the plans to be approved by the Secretary of War. The bridge must be commenced within one year and completed within three years from the date of approval of the act.

LOUISIANA.—On May 6 a bill was introduced in the House of Representatives authorizing the Shreveport & Red River Valley Ry. to build two bridges across Bayou des Glaize, in Aroyelles Parish, La.

MIDDLETOWN, PA.—It is said that engineers of the Pennsylvania R. R. have made surveys for the proposed subways in this town and favorable action of the Town Council is expected soon.

MILWAUKEE, WIS.—Mayor Rose has signed a resolution appointing a special committee in regard to building a viaduct at Twenty-seventh street by the Milwaukee road; also for a new viaduct at Sixth street.

NEWBURYPORT, MASS.—The Governor has signed a bill authorizing the County Commissioners to spend a larger amount of money for the Merrimac River bridge. The contract has just been let to the Boston Bridge Works, at $295,361.

NEWPORT, ARK.—The Newport Bridge, Belt & Terminal Ry. Co. has been incorporated to build a bridge over White River with accompanying terminals. Incorporators are: C. H. Jackson, of New York; Samuel Russell, of Brooklyn; E. S. Jackson, of New York; T. D. Kinman, Thomas E. Morrison, Joseph M. Stayton and Henry Owen, of Newport, Ark.

NEWPORT NEWS, VA.—The Chesapeake & Ohio is reported to have made a proposition to the city to pay the cost of masonry and bridging for the subway for a street under its yards from Jefferson avenue and Twenty-second street to Fifteenth street, a distance of nearly half a mile.

OTTUMWA, IOWA.—Plans are now being considered by the City Council for extensive improvements by the Burlington and the Rock Island roads in the East End. It is proposed to build a viaduct on the extension of Walnut street.

OTTAWA, ONT.—Bids are wanted until May 26 by Chas. H. Keefer, Metropolitan Building, Ottawa, for building a combined concrete dam and railroad bridge at Peterborough. The work includes a power house 108 x 80 ft., furnishing and erection of all steel, iron and expanded metal, etc. Plans and specifications are at the office of the American Cereal Co.

PARKERSBURG, W. VA.—It is said that the Gould interests will soon let a contract for a steel bridge to cross the Ohio at Parkersburg.

PERTH AMBOY, N. J.—Foster N. Voorhees writes us that plans for his proposed bridge over the Raritan River are so indefinite that no information can be given at present.

The Freeholders have decided to sell the franchise for the proposed bridge over the Raritan River between Perth and South Amboy. No bid will be considered under $50,000. (April 25, p. 313).

PITTSBURGH, PA.—Newspapers report that Mr. Brown, Chief Engineer of the Pennsylvania, is having plans made for $10,000,000 or more of improvements for Pittsburgh. This is said to include a new freight terminal at East End, a new passenger station at the same point, a new 1,300-ft. bridge over the Allegheny and several miles of tracks, switching yard and roundhouse near Silver Lake.

RAT PORTAGE, ONT.—It is said that surveys are being made preliminary to making plans for the new Government bridge over Winnipeg River. R. P. Fairbairn, Ottawa, Ont., Engineer.

ROCHESTER, N. Y.—Bids are wanted for strengthening the Vincent street bridge. (May 9, p. 352).

SALEM, MASS.—The Boston & Maine has asked the County Commissioners for permission to widen the overhead bridge at Castle Hill.

SAN FRANCISCO, CAL.—C. E. Grumsby, City Engineer, writes in reference to the proposed bridges across Channel street on Third street, and across the railroad right of way on San Jose avenue, that the Board of Supervisors are asked to make provision in the tax levy for the ensuing year to begin work on the Third street bridge, if possible, and to provide for widening the bridge on San Jose avenue. No decision has yet been made for the Third street bridge.

According to local reports, an officer of the Santa Fe has asked the city officers for permission to build three bridges in Potrero in connection with the re-grading of streets.

SOUTH BEND, IND.—Bids are wanted June 10 for building one concrete arch over Dry Run on Pennsylvania avenue: also for one concrete steel bridge known as Milan arch over East Race, according to plans on file with the County Auditor.

SOUTH CAROLINA.—Bills were introduced in the U. S. Senate and House of Representatives on May 7 authorizing the Charleston, Suburban & Summerville Ry. to build two bridges across the Ashley River, in Charleston and Dorchester Counties, South Carolina.

SPRINGFIELD, MASS.—The County Commissioners and the Mayor are considering several petitions for bridges, some of which, it is said, will be authorized to be built at once.

SPRINGFIELD, OHIO.—City Civil Engineer W. H. Sieverling has submitted an estimate to the Board of Public Affairs showing that it will cost $5,500 for a bridge in Sherman avenue and Nelson street. A new bridge in Bechtle avenue is also spoken of.

STILLWATER, MINN.—The County Surveyor has submitted estimates to the County Commissioners for a bridge over Phalen Creek at Stillwater.

TENNESSEE.—The U. S. Senate on May 6 passed a bill authorizing the Memphis & Chattanooga Ry. to build a bridge across the Tennessee River, in Marion County, Tenn.

On May 9 bills were introduced in the House of Representatives authorizing the Cairo & Tennessee River R. R. to build two bridges, one across the Tennessee River and one across the Cumberland River.

TUNKHANNOCK, PA.—Viewers are reported to have decided in favor of a bridge at this place, and for a new bridge over the creek at Dixon and at Nicholson.

WAKEFIELD, MASS.—Bids are wanted May 31 for a bridge over the Boston & Maine tracks in Greenwood. Address E. H. Morton at the latter place.

WESTFIELD, MASS.—The bridge committee appointed some months ago to consider a new bridge over the South Branch of Westfield River, is considering recommending a steel bridge at a cost of about $20,000.

WESTFIELD, N. J.—The special bridge committee of the county has recommended a new iron bridge to be built over the brook on Broad street. Cost not to exceed $1,200.

WINFIELD, KAN.—The County Commissioners are said to be receiving bids for a stone and steel bridge over Walnut River.

Other Structures.

AUGUSTA, ME.—John F. Hill, P. O. Vickery and others, of this city, are organizing a company to build an iron foundry in Augusta. Williamson & Burleigh are counsel for the new company.

BEAVER FALLS, PA.—It is said that a second bridge plant will be built at Beaver Falls by the Penn Bridge Co. There will be a reorganization, according to report.

BLOOMINGTON, ILL.—In regard to the report that a union station will be built in Bloomington by the Alton, the Lake Erie & Western and the Big Four roads, we are told that it is not probable that a union station will be built. The Alton is having plans made for its own station.

CEDAR RAPIDS, IOWA.—It is said that the present freight station of the Chicago & North Western in Cedar Rapids will soon be torn down and a new structure, 680 x 40 ft., built.

CINCINNATI, OHIO.—Work has been begun by the Big Four on a new freight station to be 275 x 25 ft.

CLAIRTON, PA.—The St. Clair Steel Co. will issue $9,000,000 in bonds for a finishing department in connection with its plant at Clairton.

CLEVELAND, OHIO.—The Cleveland Furnace Co. has been organized, with a capital of $1,000,000, to build a furnace with about 400 tons daily capacity. The directors are Archer Brown, New York; D. B. Meacham, Cincinnati; William G. Park, New York, and S. W. Croxton, of Cleveland. Mr. Meacham, of Rogers, Brown & Co., was elected president and David T. Croxton, manager of the Penn Yan Iron & Steel Co., of Ohio, general manager. C. B. Smith was elected secretary and treasurer.

The Acme Machinery Co. is adding to its plant by building on St. Clair street a shop 70 x 180 ft. and a two-story stone and brick office building 50 x 60 ft.

CUYAHOGA FALLS, OHIO.—The Cuyahoga Wire & Fence Co. has been formed to take over the Cuyahoga Steel & Wire Co., of Cuyahoga Falls, and the Hartman Mfg. Co., of New Castle, Pa. The main office will be at Cuyahoga Falls. On May 8 the entire holdings of the Hartman Mfg. Co. were sold at auction, it is said, at $160,000 for the local plant, and $75,000 for the Ellwood plant.

DANBURY, CONN.—Preliminary surveys for a new railroad station on White street have been made by engineers of the New York, New Haven & Hartford.

DONORA, PA.—Plans are reported made by the Union Steel Co. for improvements, to cost about $12,000,000. It is said contracts for much of the machinery have already been let. The plans were made by Julian Kennedy.

ELIZABETH, N. J.—The North Jersey Street Ry. Co. proposes to build new car barns in Elizabeth, but we are told that no decision will be made for some weeks yet.

GRAND FORKS, N. DAK.—It is said that plans are being made for a new freight depot for the Great Northern in Grand Forks.

HAZELWOOD, PA.—The American Foundry & Construction Co., recently chartered, will soon have a foundry and machine shops finished in Hazelwood. J. Miller is President, and H. E. Weiskopf is General Manager. The company has opened a general office in the Frick Building, Pittsburgh.

KNOXVILLE, TENN.—An officer of the Southern writes that it is not the intention of the company, at least at the present time, to enlarge its shops and build locomotives at Knoxville, as currently reported. If the Knoxville shops are enlarged, it will be in order to facilitate repairs.

The Louisville & Nashville denies the report that the shops at Louisville will be removed to Knoxville.

MCKEES ROCKS, PA.—Contracts have been let by the Pittsburgh & Lake Erie for new machine shops to be built at McKees Rocks, to the McClintic-Marshall Construction Co. at $150,000. The building will be of brick and stone 500 x 170 ft. The machinery in the new shops will be of the latest type and include electric traveling cranes with a working capacity of 120 tons. The work will be done under the supervision of L. H. Turner, Superintendent of Motive Power. Another contract recently let by this company is for an ice house near the Pittsburgh terminal. Additional contracts are to be let.

MONTREAL, QUE.—The Grand Trunk Ry. is negotiating with the Harbor Commissioners with a view to building a grain elevator in Montreal Harbor at Windmill Point, to cost about $1,000,000.

NEW BRUNSWICK, N. J.—The Pennsylvania R. R. is preparing to build a new freight house in New Brunswick, when the tracks are elevated.

NEW YORK, N. Y.—Plans have been filed with the Department of Buildings for the main power house of the Rapid Transit Subway Co., which is to be on the west side of Eleventh avenue and between 58th and 59th streets.

SYRACUSE, N. Y.—Chas. A. Lockard, General Manager of the Empire Portland Cement Co., has announced that the company will rebuild the plant recently burned and that the Osborn Engineering Co., of Cleveland, Ohio, will make the plans. The buildings are to be made as near fireproof as possible.

TITUSVILLE, PA.—Contracts have been let by the Titusville Iron Co. for a large addition to its plant which will practically double the capacity. The capital stock will be increased to $500,000.

TOLEDO, OHIO.—Contract for building the Toledo Railway & Terminal Company's roundhouse has been let to W. W. Bright Construction Co., of Toledo.

WARREN, PA.—The Marinette Iron Works Mfg. Co. has had plans made for some new buildings. The machine shop will be 80 x 350 ft.; the foundry, 80 x 250 ft.; other buildings include a blacksmith shop, pattern shop and storage. The entire plant will be operated by electricity, the power being supplied by gas engines.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xviii.)

Western Railway Club.

The next regular meeting of this Club will be held in the Auditorium Hotel, Chicago, on Tuesday, May 20. A paper entitled "A Diagnosis of M. C. B. Coupler Defects, Based on Results Obtained in Service," will be presented by Mr. R. D. Smith, Superintendent of Motive Power, B. & M. R. R. It is expected that the Committee on Underframing will report at this meeting. The annual election of officers will also occur.

Canadian Railway Club.

A regular monthly meeting of the Canadian Railway Club was held at the Windsor Hotel, Montreal, May 13. The papers were: Modern Locomotive Engine Management, by Mr. T. McHattie, M. M., G. T. R., Montreal; Manufacture of Iron and Steel, by Mr. R. R. Neild, C. P. R. Mechanical Dept., Montreal; exhibit of the new Two-direction Train order signals, illustrated and described by Mr. Hiram Piper.

St. Louis Railway Club.

Owing to the death of Mr. W. E. Cunningham, Superintendent of the Burlington Route, which occurred at St. Louis on May 6, the trip to Hannibal, where the May meeting of the St. Louis Railway Club was to be held, is postponed for one week. The May meeting will, therefore, be held on Friday, May 16, and the special train for members and their families will leave Union Station, St. Louis, at 9 o'clock a.m., of that date, instead of as previously announced.

Association of Railroad Surgeons.

The International Association of Railway Surgeons held its fifteenth annual meeting in St. Louis and on May 2 elected officers as follows: Dr. A. W. Candless, of St. Louis, President; Dr. Louis J. Mitchell, of Chicago, and Dr. James A. Duncan, of Toledo, re-elected Secretary and Treasurer, respectively. The following were elected Vice-Presidents: Dr. A. L. Wright, of Iowa; Dr. John B. Rule, of St. Louis; Dr. J. C. Wysor, of Virginia; Dr. E. E. Kitchener, of Canada; Dr. W. G. Jamie-

son, of Texas, and Dr. R. Ortogo, Mexico. Indianapolis was selected as the next meeting place.

American Society of Mechanical Engineers.

The 40th meeting of the Society will be held in Boston May 27 to 30. The official hotel will be Hotel Brunswick, Clarendon and Boylston streets. Accommodations on the American plan will be at the special rate of $4.00 per day for one person in a room, or $7.00 for two in one room. The professional sessions will be held at the Massachusetts Institute Technology, Engineering Building B, Trinity Place. A brief of the programme follows:

Tuesday afternoon (27th) is left free for assembly of members in the city and for individual visits to points of interest. The following Clubs have extended their privileges to members of the Society during the meeting. The number badges will serve as identification when visiting any of them: Boston Art Club, Technology Club, St. Botolph Club.

Tuesday evening, 9 p.m., opening session. The Society will be officially welcomed by Dr. Henry S. Pritchett, President of the Massachusetts Institute of Technology, and by Mr. George A. Kimball, President of the Boston Society of Civil Engineers, the oldest engineering society in America. After the addresses there will be a reception.

Wednesday, May 28th, entertainment to the visiting ladies.

Second session at 10 a.m. Business session. Final report of the Committee appointed to codify and standardize the methods of making Engine Tests; Supplementary Report of Committee on Standard Pipe Unions; W. R. Webster, Specifications for Steel Forgings, Castings and Boiler Plates; Geo. H. Barrus, Tests of Steam Pipe Coverings.

Wednesday afternoon, excursion to Massachusetts Institute of Technology. Enough guides will be present so that there will be a guide to each small party, and by having the parties start at different times and cover different routes, each member will have convenient opportunity to see all parts.

Wednesday evening, 8:30 o'clock.—Third session. Professional Papers: H. M. Lane, Repairing a Broken Cylinder; I. E. Moultrop and R. E. Curtis, Construction of Atlantic Avenue Power Station, Boston; R. E. Curtis, Swivel Joint for High-Pressure Main; R. H. Fernald, Determining Temperatures of Exhaust Gases in Combustion Engines; R. H. Fernald, Working Details of a Gas Engine Test; Charles E. Lucke, Liquid Fuel Combustion.

Thursday, May 29th, 10 a.m.—Fourth session. Professional papers: Gus C. Henning, A Roller Extensometer; Fred H. Colvin, Mechanical Stokers for Locomotives; A. K. Mansfield, Improved Indicator Cock for Engines; W. A. Smith Wright, Electricity in Cotton Mills; Wm. H. Bryan, Some Details of Direct Connected Generator Sets; J. N. Le Conte, A Graphical Determination of Piston Acceleration.

Thursday morning, ladies' excursion.

Thursday afternoon, excursion to various points of interest—the Atlantic Avenue Power Station of the Edison Electric Illuminating Company, of Boston; Boston Harbor and Fore River Ship and Engine Company.

Thursday evening, reception to members and guests by the Trustees of the Museum of Fine Arts, and the local membership. Entrance on Copley Square.

Friday, closing session, 10:30 a.m., the Society will be the guests of Harvard University. This session will be held in the lecture-room of Pierce Hall at Harvard University, Cambridge. Professional papers as follows: R. H. Soule, Technical Index and File; F. M. Bowman, The Lowell Gaslight Company's Coal Pocket; Chas. R. Pratt, Elevator Safeties; V. E. Edwards, the Flying Shear; C. C. Tyler, Standards for Machine Screws; John D. Riggs, Cold Working of Sheet Metals in Dies.

At the close of the session, members of the Society and ladies accompanying them will be guests of the President and Fellows of Harvard University at lunch in the Harvard Union, at 1 p.m. After lunch, President Elliot will make a short address, replied to by the President of the Society.

PERSONAL.

—Mr. J. H. McMillan, Vice-President of the Detroit & Cleveland Navigation Company, died at Colorado Springs, March 9, after an illness contracted in the Spanish-American War. Mr. McMillan was about 38 years of age.

—The new Division Superintendent at Connorsville, Ind., of the Cincinnati, Hamilton & Indianapolis, Mr. W. C. Shoemaker, was born at Tamaqua, Fla. He was graduated from the Reading High School in 1886 and the same year entered Lehigh University, graduating four years later. He was then employed on surveys and construction of various railroads, and in 1893 entered the Transportation Department of the Cincinnati, Hamilton & Dayton. In the spring of 1896, Mr. Shoemaker was appointed Assistant Superintendent, from which position he has recently been promoted.

—Mr. John Birse, Division Master Mechanic of the Chicago Great Western, is a Canadian, having been born at Montreal, March 23, 1863. After serving his apprenticeship as a machinist for the Grand Trunk he became a machinist for the Northwestern Railway (Canada). From then until 1892, when he became Trainmaster of the Chicago Great Western, Mr. Birse passed through various subordinate positions on different roads. From 1894 to 1898 he was Supervisor of the Chicago Great Western and then Trainmaster. In 1900 Mr. Birse was appointed Master Mechanic at Des Moines, Iowa, from which position he was transferred to his present position.

—Mr. R. K. Rochester, Acting Engineer of Maintenance of Way of about 280 miles of the Vandalia Line at Logansport, Ind., is 23 years old. While attending school Mr. Rochester managed to secure employment each summer in some branch of railroad work and during the summer of 1900 he was Engineer in charge of dock construction for the Algoma Central at Sault Ste Marie. In 1901 he was graduated from the Rose Polytechnic Institute (Civil Engineering Department), Terre Haute, Ind., and immediately after he went with the American Car & Foundry Company, in the estimating and designing department. About five months ago he accepted the position of Assistant Engineer of the Terre Haute & Logansport and upon the resignation of Mr. Hendricks was promoted to his present position.

—Mr. W. E. Cunningham, Superintendent of the St. Louis, Keokuk & Northwestern, and of the Chicago, Burlington & Kansas City, portions of the Burlington System, with headquarters at Hannibal, Mo., died in St. Louis on May 6th. He was afflicted with Bright's disease and had been quite ill for about three months, and finally went into the Rebecca Hospital in St. Louis, where he died. Mr. Cunningham had been in the employ of the Burlington for 25 years, having started in as a message boy at Burlington, Iowa, and held various positions, including that of Trainmaster, Superintendent of Telegraph, Chief Despatcher and Assistant Superintendent. He was appointed Superintendent of the St. Louis, Keokuk & Northwestern and Chicago, Burlington & Kansas City in 1887, and held that position until his death. He was buried at Hannibal on May 8.

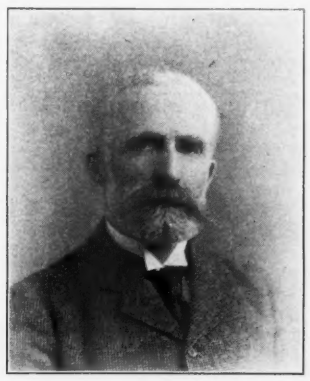
—Mr. R. H. Ingram, who recently became Superintendent of the Los Angeles Division of the Southern Pacific, was born at Henderson, Ky., in 1859. In 1876 he became a clerk for the Pullman Southern Car Company. In 1881 he entered the accounting department of the Louisville & Nashville, and three years later was made Assistant Controller. The following year (1885) he left railroad service. In 1888 he returned to the Louisville & Nashville as Assistant to the President. In 1895 he went with Mr. Hays to the Grand Trunk and was, in 1899, appointed Treasurer of the Central Vermont. When Mr. Hays went West, Mr. Ingram went with him as his executive Secretary, and after Mr. Hays's resignation continued in the same capacity with Mr. Kruttschnitt, until April 15, this year, when he was appointed to the position of Division Superintendent as stated above.

—Mr. S. B. Floeter, Superintendent of the Northern Division of the Cincinnati, Hamilton & Dayton, has held the superintendency of different divisions of this company since 1893. He was born at Chatham, Ont., in 1853, and entered railroad service in 1872 as a telegraph operator for the Great Western of Canada. For three years, 1881 to 1884, was Chief Despatcher of the Detroit, Mackinaw & Marquette and for the three years following was Trainmaster, and later, held a similar position on the Duluth, South Shore & Atlantic. For a few months he was Train Despatcher for the Wheeling & Lake Erie. In 1889 he was appointed Superintendent of Telegraph of the South California and at the end of one year went with the Toledo, St. Louis & Kansas City as Train Despatcher. Mr. Floeter's first service with the Cincinnati, Hamilton & Dayton was in 1892, when he was appointed Trainmaster and he has continued with this company ever since.

—The announcement comes with such authority that its authenticity can hardly be questioned that Mr. J. N. Barr will leave the office of Mechanical Superintendent of the Erie Railroad, June 1, to take the position of General Superintendent of the Chicago, Milwaukee & St. Paul. Mr. Barr went to the Erie from the Baltimore & Ohio Oct. 1, 1901. On the Erie he has been principally engaged, so far as we learn, in improving the equipment, organization and administration of the shops, with a view to reducing the cost of repairs. We suppose that it will be found that important results have been attained. The Erie organization heretofore has been defective in that the man at the head of the Motive Power Department has not been able to use his authority effectively in the division shops and over the division men. With Mr. Barr's great knowledge, his executive power and the backing of his President, he has doubtless been able to introduce changes the effect of which will be felt after he leaves. At the same time, it seems unfortunate that he could not have been prevailed upon to stay on the Erie a year or two longer. We printed a sketch of Mr. Barr's career Oct. 20, 1899, when he went to the Baltimore & Ohio. To this we added a few words Sept. 27, 1901, when he went to the Erie. It seems unnecessary to say anything more about him at this time.

—Dr. Henry Morton, President of the Stevens Institute of Technology, died May 10 at a private hospital at No. 33 East Thirty-third street, New York City. For many years Dr. Morton has held a prominent position as a scientific man and his name has long been very familiar; but to many of our readers he is especially known as the President of Stevens. As a teacher, and as the administrator of that institution much the best and most useful of his work was done. He was devoted to the Institute, and gave to it various sums, amounting to $145,000. Largely through Professor Morton, Andrew Carnegie became interested in the Institute, and recently erected and endowed the Carnegie Engineering Laboratory. Dr. Morton was the son of the Rev. Dr. Henry Jackson Morton, for half a century rector of St. James's Protestant Episcopal Church in Philadelphia. He was born in that city Dec. 11, 1836, and was graduated from the University of Pennsylvania in 1857, taking a post-graduate course in chemistry. He then determined to study law, and with that end in view entered the offices of George M. Wharton in Philadelphia, but was offered the post of instructor in chemistry and physics at the Protestant Episcopal Academy in Philadelphia. He accepted it, and has since devoted his life to scientific work. In 1859 he published a translation of the text of the Rosetta Stone, and in 1868 was the chief of an expedition organized to observe and make photographic records of a total eclipse of the sun in Iowa. He was at that time Resident Secretary of the Franklin Institute and editor of its *Journal*, but he assumed the Presidency of Stevens when it was founded, in accordance with the will of Edwin A. Stevens, in 1870, selecting the original faculty, and holding his office without interruption until the day of his death.

—Mr. Peter Alexander Peterson was made Consulting Engineer of the Canadian Pacific Ry., last March, after about 12 years of service as Chief Engineer of that system. Mr. Peterson was born at Niagara Falls, Canada, Nov. 8, 1839, and was educated at Toronto University College. He entered railroad service at once, but engaged in general practice from 1861 to 1865. Then he returned to railroad service, where he has been since, excepting for three years, when he was Chief Engineer of the Toronto Water Works. His work has been substantial and steady and long ago gave him a fine place in the profession. He has taken great interest in maintenance of way and has done much valuable work in investigation of masonry construction. He has been in charge of considerable important bridge work, including the Lachine bridge across the St. Lawrence. We are not told why he chooses to take the less exacting position of Consulting Engineer on the Canadian Pacific, but obviously he is good for many years of hard work yet. In 1896 and 1898 he served a term as Vice-President of the American Society of Civil Engineers. In 1892 and 1893 he was a Director of that society.



ELECTIONS AND APPOINTMENTS.

Arizona & New Mexico.—E. Schumann has been appointed Superintendent, with headquarters at Clifton, Ariz., succeeding H. J. Simmons, resigned.

Atchison, Topeka & Santa Fe.—John Player, Consulting Superintendent of Motive Power, with headquarters at Topeka, Kan., has resigned.

Baltimore & Ohio.—Reorganization of the freight traffic department of the Pittsburgh & Trans-Ohio Divisions of the B. & O., will be effective June 1. The territory is to be redistricted so that the division freight agents will have control of an average of 350 miles of road each. Recently acquired lines were formally absorbed by the Traffic Department, having been taken over by the Transportation Department some time ago. Among them are the Pittsburgh & Western, the Cleveland Terminal & Valley, the Cleveland, Lorain & Wheeling, and the Ohio & Little Kanawha.

Following are the new traffic divisions with the officials in charge: Pittsburgh & Connellsville Division, 432 miles; H. M. Matthews, Division Freight Agent, Pittsburgh. Pittsburgh & Western Division, 228 miles; W. L. Cromlish, Division Freight Agent, Pittsburgh. Cleveland Division, 381 miles; J. E. Galbraith, Division Freight Agent, Cleveland, Ohio. Chicago Division, 280 miles; C. T. Wight, Division Freight Agent, Sandusky, Ohio, and the Newark Division, 433 miles; O. A. Constans, Division Freight Agent, Columbus, Ohio. The following commercial freight agencies will be continued: T. J. Walters, Pittsburgh; H. H. Marsh, Wheeling; C. F. Wood, Cleveland; H. E. Warburton, Akron; E. M. Kendall, Toledo; J. Hutchings, Detroit. At present at Cleveland there is a general freight agent in charge of the C., L. & W. and a Traffic Manager in charge of C., T. & V. The two offices are combined with a Division Freight Agent in charge. The Division Freight Agency at Tiffin is consolidated with the Division Freight Agency at Sandusky. The General Freight Agency of the P. & W. is changed to a Division Agency.

Brooklyn Rapid Transit.—J. F. Calderwood has been appointed Assistant to the President.

Chicago, Burlington & Kansas City.—(See Hannibal & St. Joseph.)

Chicago Great Western.—H. A. Fergusson has been appointed Assistant Superintendent of Motive Power, with headquarters at St. Paul, succeeding F. N. Risteen, resigned. P. M. Crosby becomes General Foreman of the Oelwein Shops, succeeding Mr. Fergusson, effective May 12. A. E. Harvey, Division Engineer, has been transferred to the Fort Dodge Division as Division Engineer, with headquarters at Fort Dodge, Iowa, and C. P. Cogswell, Jr., Acting Division Engineer of the Fort Dodge Division, succeeds Mr. Harvey as Division Engineer, at Red Wing, Minn.

Chicago, Milwaukee & St. Paul.—Jacob N. Barr, heretofore Mechanical Superintendent of the Erie, has been appointed General Superintendent of the C., M. & St. P., with headquarters at Chicago, Ill.

Colorado & Southern.—E. Hawley has been elected a Director, succeeding O. Ames.

Cumberland Valley.—M. C. Kennedy has been elected President and W. L. Ritchey, Secretary.

Erie.—Jacob N. Barr, Mechanical Superintendent, with headquarters at Meadville, Pa., has resigned, effective June 1. (See Chicago, Milwaukee & St. Paul.)

G. G. Cochran, heretofore Freight Traffic Manager of the Chicago & Erie at Cleveland, has been appointed Assistant to the President of the Erie, with headquarters at New York City.

Grand Trunk.—F. Price has been appointed Master of Transportation, with headquarters at London, Ont., succeeding C. H. Bevington. (See Rutland.) The headquarters of Garret Vliet, Assistant Master Mechanic, have been removed from Gorham, N. H., to Portland, Me. W. E. Costello has been appointed Assistant Superintendent, with headquarters at London, Ont.

Hannibal & St. Joseph.—Henry Miller, heretofore Assistant Superintendent, has been appointed Superintendent of the St. Louis, Keokuk & Northwestern and the Chicago, Burlington & Kansas City, with headquarters at Hannibal Mo., succeeding W. E. Cunningham, deceased. Effective May 10.

Lehigh Valley.—W. H. Vaughn has been appointed General Foreman, with headquarters at South Easton, Pa.

Mexican Central.—At the annual meeting held May 7, the following new Directors were elected: Eugene N. Foss, Breckinridge Jones, Gabriel Morton (Vice-President), and Hiram R. Nickerson, of Mexico.

Oregon R. R. & Navigation.—R. B. Miller has been appointed General Freight Agent, with headquarters at Portland, Ore. (See Southern Pacific.)

Rutland.—W. S. Jones, General Superintendent, having resigned, the office of General Superintendent has been abolished and the office of Superintendent has been created, with C. H. Bevington in charge, with headquarters at Rutland, Vt.

St. Louis & Gulf.—The following appointments have been made: William E. Harrington, Superintendent of the Cape Girardeau Division; G. W. Carlisle, Superintendent of the Bloomfield Division; Emil Sebastian, Superintendent of the Kennett Division; W. B. Warren, Master Mechanic, and James F. Brooks, Chief Engineer.

St. Louis, Keokuk & Northwestern.—(See Hannibal & St. Joseph.)

Southern California.—S. T. Park, heretofore Division Master Mechanic of the Santa Fe Pacific at Winslow, Ariz., has been appointed Division Master Mechanic of the S. C., with headquarters at San Bernardino, Cal., succeeding C. F. Lape, resigned.

Southern Pacific.—W. E. Coman, Assistant General Freight Agent of the Oregon R. R. & Navigation, has been appointed General Freight and Passenger Agent of the S. P., succeeding R. B. Miller. (See Oregon R. R. & Navigation.)

White River (Missouri Pacific).—The following appointments have been made: W. C. Stith, Freight Traffic Manager; H. C. Townsend, General Passenger Agent; S. B. Schuyler, General Auditor; Wm. Cotter, General Superintendent; W. C. Watrous, Superintendent of Transportation; H. Rohwer, Chief Engineer; E. Fisher, Engineer of Bridges and Buildings; J. O. Pattee, Superintendent of the Locomotive and Car Department; W. G. Nixon, Purchasing Agent; Geo. Snodgrass, Assistant Purchasing Agent; J. G. Hartigan, Superintendent, and C. W. Hammond, Superintendent

of Telegraph. (See R. R. Construction column, April 25, page 316.)

Yazoo & Mississippi Valley.—W. F. Meath has been appointed Division Superintendent, with headquarters at Memphis, Tenn., succeeding A. A. Sharp.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

Atchison, Topeka & Santa Fe.—Work is reported begun on the Eastern Oklahoma line which is to run from Newkirk, Okla. T., to Pawnee, about 45 miles, in a southeasterly direction, air line.

Contract is reported let to L. J. Smith, of Galveston, Texas, to build the 20-mile extension from the present terminus of the Gulf, Beaumont & Kansas City Division at San Augustine, Texas, to Center. It is said that work will begin soon.

Autauga.—Notice of incorporation was filed with the Secretary of State of Alabama May 4, for a railroad to run from Booth Station, on the Mobile & Ohio, Autauga County, Ala., to Autaugaville, eight miles distant. The principal place of business will be Autaugaville, and the incorporators are M. M. Smith and M. Howard, of Autaugaville; S. M. Dinkins and J. V. Smith, of Montgomery, and others.

Baltimore & Ohio.—Contract has been let to F. H. Clements & Co., of Philadelphia, for a new low grade freight line between Cherry Run and Wilson's. This line will be 10 miles long. The present line is only 8½ miles, but has grades against traffic of 39 ft. to the mile as against 13½ ft. on the new line. The work will involve about eight large stone arch bridges.

Black & Cache River.—The Arkansas State Board of Railway Incorporators considered on May 2 the application for a charter for this line which it is proposed to build from Newport, Ark., into Missouri, 80 miles. Twenty miles have already been built from Sedgwick, Lawrence County, Ark., to Gage, Craighead County. Opposition has been made by the Jonesboro, Newport & Western, which operates in practically the same territory. J. E. Culver, of Kansas City, is Auditor. (Construction Supplement, March 14, 1902.)

California Midland.—It is said that work will be begun at once by this company on an extension of the Eel River & Eureka from Burnells, Cal., to a point on Eel River, five miles from the northern boundary of Mendocino County, a distance of 62 miles. (Construction Supplement, March 14, 1902.)

California Roads.—It is said that a line will be built from Stockton, Cal., to Big Trees, with branches. A company has been organized for this purpose, but the names of the incorporators are not known, at the present time.

Canadian Pacific.—Surveys are reported in Northwest Territory for a proposed change in the main line from Caron to a point 65 miles west.

Central Florida & Gulf Coast.—Surveys are reported 22 miles south from Plant City, Fla., for this new line, and grading is being done on this section. The line, when completed, will be 135 miles long from Plant City to Boca Grande, with a branch. John H. Dowe, Plant City, Fla., is General Manager. (April 11, p. 277.)

Chesapeake Western.—On May 1 a new line between Stokesville, Va., and Bridgewater, 14 miles, connecting with the former Chesapeake & Western, which the above company has acquired by lease, was opened. The entire line from Stokesville to Elkton, Va., 41 miles, is now operated as a division of the Chesapeake Western. DeWitt Smith, of New York, is President. (See under Western Maryland, Railroad News, April 11.)

Chicago Great Western.—Arrangements are being made, it is said, to elevate the crossings in Waterloo, Iowa. This is to be done in connection with improvement of the right of way north of the city, which is to be undertaken.

Chicago, Rock Island & Pacific.—Contract is reported let to Winston Bros. & Craney, of Minneapolis, to grade an extension from Chickasha to Ardmore, Ind. T.

Cincinnati & Indiana Western.—Contract has just been let to W. Knight Clynes, of Jersey City, N. J., for grading 14 miles through the Kentucky mountains to the Ohio State line. The contract includes seven or eight sections and is the heaviest work on the line. It is all open cuts and fills. The rock is of such nature as not to permit of tunneling. The work will cost about $700,000 and is to be finished by Oct. 1. Contracts for rails and rolling stock, it is understood, are not yet let.

Clear Fork.—Incorporation was granted on May 6 for a line from a point on the branch of the Jellico, Lafollette & Knoxville, now being built from Lafollette, Tenn., up Clear Fork, to run east for a distance of about five miles to the head waters of Clear Fork River. Incorporators are W. D. Hines, B. D. Warfield, and others.

Columbia River & Northern.—An officer writes that the route of this new line will extend from Lyle, Wash., along the Klickitat River and Swale Canyon through Centerville to Goldendale, Wash. A line of steamers between Portland and The Dalles, on the Columbia River, Ore., has been acquired and is now in operation. The steamer route is about 140 miles and the rail division 45 miles. Bids were opened May 10 for grading 20 miles of the line, and bids for the remainder will be considered in the near future. It is expected that track laying will begin at the Lyle end of the road about Sept. 15, and that the road will be finished this year. Maximum grades will be 2 per cent., and maximum curvature 12 deg. Rufus Mallory, 263 Yamhill street, Portland, Ore., is President, and Emery Oliver, Chief Engineer; Geo. W. Simons is Auditor.

Denver & Northwestern.—It is reported by interested parties that sufficient funds have been raised to assure the building of this projected road between Denver and Salt Lake City. The route from Salt Lake runs down the Salt Lake and Provo Valleys, crossing the Wasatch Mountains near Springville. From that point Strawberry Creek is followed to the Duchesne, and the Duchesne to Green River. The line is next to run along the White River crossing the mountains near Trapper's Lake. From this point the Grand is followed to the vicinity of James Peak, where a tunnel is to be built, and from that point the road will go in almost a direct line to Denver. D. H. Moffatt and Senator W. A. Clark are interested.

Fonda, Johnstown & Gloversville.—At a recent meeting of the directors it was decided to double-track the line between Gloversville and Schenectady, N. Y., a distance of about 40 miles.

Great Central.—This company filed articles of incorporation in Oregon May 4, with the intention of building a line from Salt Lake through Utah, Idaho and Oregon to Coos Bay on the Pacific Coast. The incorporators are J. T. Ross, J. K. Kollock and J. E. Atchison, of Portland, Ore.

Guyandotte Valley.—Surveys are reported in West Virginia from Midkiff to Crawley's Creek, 30 miles, and it is said that contracts will be let shortly. J. L. Caldwell, of Huntington, W. Va., is President.

Houston, Beaumont & Northern.—Charter under this name was filed at Austin, Texas, on May 7. The company is formed to build from Houston to Orange, Texas, passing through Beaumont and the Counties of Paris, Chambers, Liberty, Jefferson and Orange, a distance of 110 miles; also to build a branch line from Beaumont to Sabine Pass, 25 miles. Surveys are now being made and it is announced that the route is to be continued east to New Orleans, 225 miles further. A charter for the Louisiana Division will be taken out under the laws of that State. The directors are Geo. J. Gould, Leroy Trice and others connected with the Gould interests. (See under Houston, Beaumont & New Orleans, April 25, p. 316).

Houston, Brazos & Northern.—Efforts are being made to complete the necessary financial arrangements to extend this road from Houston to the Red River, 350 miles. The company now owns 53 miles of grade between Houston and Hempstead, Texas. No contract has been let. R. M. Hall, of Houston, is President.

Hudson Valley Electric.—Contract to build the extension between South Glens Falls, N. Y., and Saratoga, has been let to the Crescent Construction Co. of Schenectady. It is planned to build this line at once. (May 2, p. 336.)

Indian Territory Roads.—The St. Louis & San Francisco is reported to be interested in a project to build from Vinita, on the main line, to a connection with the extension from Blackwell, Okla. T., to Coffeyville, Kan., joining this at Bartlesville, Ind. T.

Intercolonial.—Statement is made that the Intercolonial will build a branch line six miles long from Riviere Ouelle station to the village, which is directly opposite Murray Bay. The company's main line has heretofore been six miles from the south shore of the St. Lawrence, and it has not received the Murray Bay business. Surveys are now being made and bids will be asked soon, as it is the intention to have the line in operation during July.

Interurban Terminal.—This company has been incorporated, with a capital stock of $100,000, to provide terminal facilities, including a union depot for the entrance of electric roads into Cincinnati. The incorporators are G. R. Serugham, G. H. Worthington, J. M. Kennedy and others, of Cincinnati.

Laramie, Hahn's Peak & Pacific.—Surveys were begun April 28 for the projected line from Centennial, Wyo., across the Medicine Bow and Sierra Madre ranges to Hahn's Peak. It is said that the road will be built as soon as the materials can be supplied.

Mexican Central.—Contract for the new line from San Pedro and Trevino, in the State of Coahuila, has been let to Hampton & Smith, and it is said that work will begin at once. (March 21, p. 218.)

Millen & Southwestern.—It is said that an extension 20 miles long will be built at once from the present terminus at Stillmore, Ga., to a connection with the Seaboard Air Line at either Vidalia or Lyons.

Minneapolis, Superior, St. Paul & Winnipeg.—Articles of incorporation were filed in Minnesota May 12 for a line from St. Paul north to a connection with the Canadian Northern at the International boundary. The incorporators are residents of St. Paul and Minneapolis, and the proposed capital stock is $10,000,000. Such a line could not be less than 400 miles long.

Mississippi River, Hamburg & Western.—It is reported that an extension 12 miles long is being built from the present terminus to Crossett, Ark., in the interest of the Crossett Lumber Co. The road is now in operation between Hamburg and Luna, 38 miles.

Missouri, Kansas & Texas.—Contract has been let to F. P. Kimzer & Son, of Terre Haute, for the proposed extension aggregating 265 miles in Oklahoma. It is not known at present exactly what their work includes.

New York Central & Hudson River.—An officer sends the following information about work now being done: Contract for a 250-ft. tunnel on the Hudson Division between the Peekskill and Highland stations has been let to Sundstrom & Stratton, and Drake & Stratton have a contract for a tunnel 800 ft. long on the other side of the river on the line of the West Shore. Both of these tunnels will be double-track. The removal of the curve near Stony Point on the West Shore by an open cut, which has been currently reported in the daily press, is not contemplated at present. Double-track between Brockport and Niagara Falls is now under contemplation.

Polk County (North Carolina).—Contract is reported let to Geo. F. Canis to build a line about 13 miles long from Columbus, N. C., by way of Mill Springs, to a connection with the Rutherfordton, Hickory Nut Gap & Asheville line which is projected between the points named, 35 miles. In case the Polk County is built, it will strike the former line somewhere in the vicinity of Green Island.

Pottstown & West Chester Electric.—This company was organized in Pennsylvania May 6, to build an electric road from Pottstown to West Chester, a distance of about 25 miles. John Buckwalter is President, and A. G. Ash is Vice-President. T. P. Turner, of Philadelphia, will be General Superintendent in charge of building.

Rio Grande Western.—Contract has been let to the Utah Construction Co. for 20 miles of grading from Salina, Utah, east through Salina Canyon, including several tunnels. This is on what is known as the San Pete Branch. May 2, p. 336.)

San Antonio & Crowther.—Charter has been filed at Austin, Texas, for a railroad 60 miles long, to run from San Antonio to Crowther, and reach new oil fields in that vicinity. The headquarters will be at San Antonio.

Schenectady (Electric).—A certificate of amendment to the original incorporation has been filed in New York to permit this company to add the following routes to its present line between Albany and Schenectady, including tracks within the city of Schenectady: Beginning at the southerly end of the Rexford Flats bridge at Aqueduct, in the town of Niskayuna, crossing the Mohawk River and from there to the village of Ballston Spa; also from Ballston Lake through the village of Burnt Hills to Ballston Center.

Also a line from Green Island across the Delaware & Hudson R. R. Co.'s bridge to Troy, through River, Broadway and Third streets of that city, crossing Congress street bridge to Watervliet; also through Congress street and other streets in Troy and to other points in Rensselaer County.

Southern.—A bill has just passed the Lower House of Congress to authorize $100,000 of bonds for the purpose of building a line between Chattanooga, Tenn., and Stevenson, Ala.; also for a steel bridge across the Tennessee River near Oate's Island, Marion County. It is proposed to begin work at once if the bill passes the Senate, which is considered likely.

Southern Pacific.—An officer writes in regard to the extension of the Oxnard Branch from Montalvo, Cal., to Burbank, that a portion of the route between Chatsworth Park and Burbank was completed some years ago, as was also the portion between Montalvo and Oxnard. Surveys for the remaining distance have been completed and the line is now building. Contracts have been let to Grant Bros., of Los Angeles, and Erickson & Peterson, of San Francisco. At present 37.7 miles have been let out of Montalvo, which leaves 21.8 to be built. There will be three tunnels, respectively 7,369, 934 and 599 ft. long. The maximum grade is 1 per cent. compensated, with maximum curvature of 6 deg.

South Sioux City & North Nebraska.—This company has been organized to build from South Sioux City to Jackson, Hubbard, Homer, Dakota City, Crystal Lake and thence by another route to South Sioux City again, forming a belt line. The total distance is about 30 miles.

Sumpter Valley.—Surveys are again reported for an extension west from Whitney, Ore., the present terminus of the line. Several extensions have been projected and surveyed at previous times in this direction, and it is not known what the eventual terminus will be.

Troy-Williamstown (Electric).—It is said that an electric line will be built this summer between Troy and Williamstown, Mass., 50 miles. Geo. E. Green, of Hoosick Falls, N. Y., is President.

Virginia Roads.—Location surveys are reported for a line to connect the Chesapeake & Ohio and the Norfolk & Western at Glasgow, Va. The two stations are about three-quarters of a mile apart.

Washington, Baltimore & Annapolis (Electric).—Contract has been let to Rogers & Hall, of Sykesville, Md., to grade this new electric line from the District of Columbia boundary to Westport near Baltimore, a distance of 31 miles. Work will begin at once and it is expected that the grading will be completed in two months. The route started at Chesapeake Junction, on the eastern border of the District of Columbia, follows the line of the Baltimore & Potomac nearly all the way. Traffic arrangements have been made with the Columbia Line which connects Chesapeake Junction with the city of Washington.

Washington Irrigation.—It is reported that this company will build an electric road from North Yakima, Wash., down the Yakima Valley about 30 miles. The headquarters of the irrigation company are at Seattle.

Wichita Valley.—It is said that work is to be begun soon on two extensions, one south from Seymour, Texas, to Stamford, a distance of about 75 miles, and the other north from Wichita Falls about 20 miles to a point on the Red River. Morgan Jones, Wichita Falls, is President.

GENERAL RAILROAD NEWS.

Choctaw, Oklahoma & Gulf.—For a cash consideration of $22,316,720, practically all of the capital stock was transferred May 8 to the Chicago, Rock Island & Pacific through Speyer & Co. There now remains 2.7 per cent. of the stock which is held by persons living abroad, and will be taken up as soon as it is offered.

Dayton & Troy Electric.—Arrangements are reported completed to lease the Miami Valley, which operates an electric line 16 miles long between Piqua and Troy, Ohio, and also the Piqua local and Troy local street railways. The Dayton & Troy is a new line which operates about 20 miles of track between the points named. H. P. Clegg will be General Manager of the system.

Fair Haven & Westville (Electric).—Further particulars of the new issue of stock recently referred to, show that $1,200,000 is to be applied for betterments and other purposes, and $800,000 is to be exchanged, share for share, with the entire outstanding capital stock of the Winchester Avenue road, which is to be absorbed. A majority interest in the latter company has been held since 1900.

Great Eastern.—This line, which was projected from Selma, N. C., 137 miles east to Douglas Bay, on Pamlico Sound, has been sold at auction for a nominal price to the holders of the first mortgage. It is thought that the bondholders will either complete the road themselves or sell it again, with that in view. It has been graded for 25 miles between Fremont and Snow Hill.

Mexican Northern.—The Morton Trust Co. gives notice that it will apply $54,619.20 sinking fund to the purchase of first mortgage bonds of the above company, at the lowest price at which such bonds shall be offered for sale, not to exceed 105 and accrued interest.

Orange & Northwestern.—The Texas Railroad Commission on April 26 granted this company authority to issue $650,000 of bonds on approximately 30 miles of line. The company now has $200,000 capital stock paid up outstanding, and $165,000 of this will be presented to the Commission for cancellation. Application for authority to issue bonds was a result of a meeting of the stockholders last March, and they are intended to provide for several extensions in Texas. (March 14, p. 200.)

Tennessee Central.—An amendment to the charter of the Nashville & Clarksville was filed in Tennessee May 1, changing its name to the Tennessee Central and increasing the capital stock from $7,000,000 to $8,000,000.

Utica & Mohawk Valley.—The New York Railroad Commissioners on May 7 approved the application of this company to increase its capital stock from $461,237 to $3,100,000 for purposes of extension.